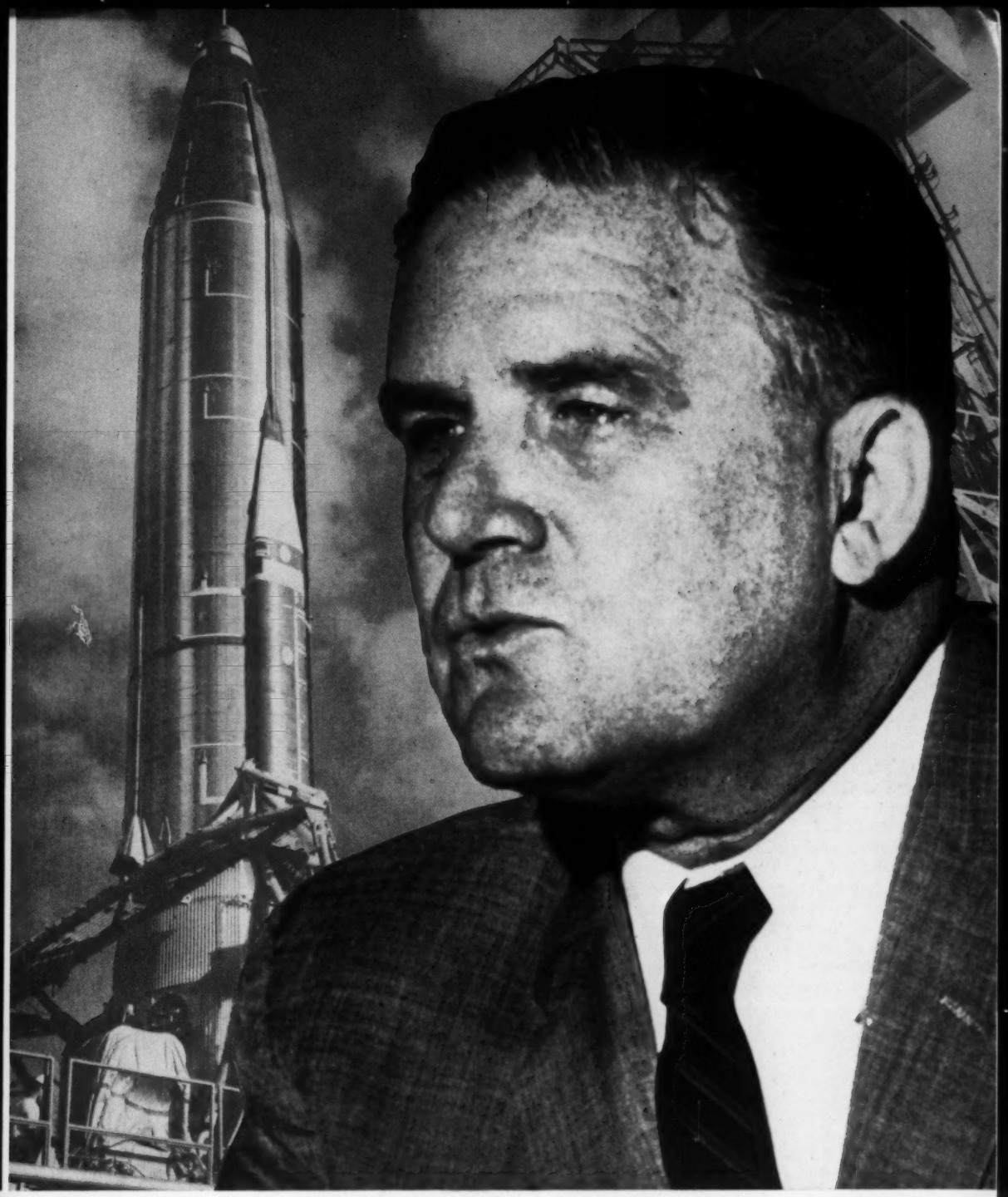
STEEL
The Metalworking Weekly
AUGUST 21, 1961



"For industry, our space program means progress at forced draft"—James E. Webb, NASA administrator

GROWING OPPORTUNITIES IN DEFENSE

What the Space Program Means to You 29

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Tips for Better Heat Treating 60

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EFFECTIVE COOLING...

How to Avoid Barrel-Shape Bores

by Dr. Robert Hahn
Chief Research Engineer
The Heald Machine Company

One of the oldest problems in high-precision internal plunge grinding is that of the unwanted barrel-shaped hole. For some time the cause of this seemingly unavoidable defect was not well understood. How could a perfectly straight wheel, perfectly aligned with the bore, plunge grind a barrel-shape hole?

Recent investigations in this area, as part of our continuing quality improvement program, have isolated the cause and pointed the way to some fairly simple solutions to the problem.

The culprit is *heat*. At the area of contact between work and wheel, the generated heat is more quickly dissipated at the ends of the bore than at the center. This temperature relationship is shown in Fig. 1, with surface temperatures reaching maximum value at the center of the bore. Maximum temperature means maximum thermal expansion—expansion that forces more metal into the wheel at the center of the bore than at the ends. With this unequal stock removal, the bore assumes a barrel shape on cooling. These relationships hold true for plunge grinding, and also, but to a lesser extent, for some cases in traverse grinding where limiting factors require a short stroke.

To reduce the barrel shape, it is necessary to level out the temperature curve—by reducing the amount of heat generated and by providing more effective cooling.

The contact area between wheel and work can be considered as a moving heat source that travels around the bore at a rate equal to the workhead speed. The faster this heat source travels, the less the heat will penetrate into the metal. Hence higher work speeds will reduce local heating. And since the heat generated is a function of contact pressure and surface feet per minute, lighter feeds and slower wheel speeds in such cases also help to reduce the thermal distortion.

Water-base coolants, copiously applied, have also proved an effective remedy. As shown in Fig. 2, the coolant flow should maintain a full "reservoir" at the bottom of the bore, as well as between the wheel and work. The coolant flow at the bottom of the bore quenches the metal immediately after the ground surface passes the wheel and assures maximum cooling effect before this point again contacts the wheel.

In practically all cases, a judicious combination of these factors—faster work speeds, slower wheel speed, lighter feeding pressure and improved cooling—will reduce the barrel-shape of a bore to negligible values. This study is typical of the continuing research being conducted at Heald to help refine the art of modern metalworking. Your nearest Heald representative will be glad to help you solve your particular grinding or boring problems.

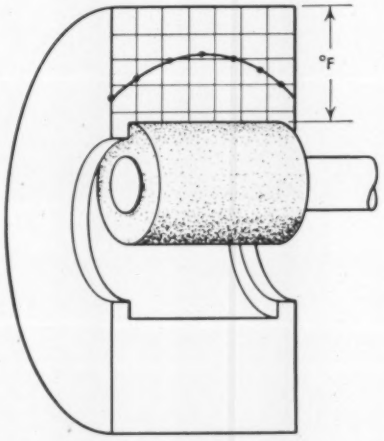

FIG. 1. Section through plunge-ground bore, showing unequal temperature rise in the metal which results in barrel-shape bore on cooling.

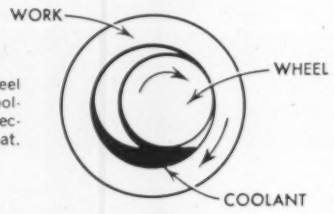

FIG. 2. End view of wheel and work, showing coolant flow for most effective dissipation of heat.

It PAYS to come to Heald

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

WORCESTER 6, MASSACHUSETTS

KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many who may find it useful to review fundamentals from time to time.

Steel *for Strength . . . Economy . . . Versatility*

Tests for Determining Mechanical Properties of Alloy Steels

The types of tests used to evaluate the mechanical properties of an alloy steel depend upon the end use of the steel involved. Mechanical properties are determined usually by tension, bend, and hardness tests, and by a group of special tests employed on tubular and wire products.

(1) *Tension tests* provide means of determining tensile strength, yield point, yield strength, proof stress, proportional limit, per cent elongation, and per cent reduction of area. This sort of test subjects the steel to stresses resulting from the application of an axial tensile load to the specimen ends, the load being sufficient to rupture the specimen.

(2) *Bend tests* often aid in determining the ductility of steel. The severity of such a test depends largely upon the bending radius used. Several factors influence the length of radius, including thickness of the test specimen, width of test specimen, direction of test, chemical composition, tensile strength of specimen, etc.

(3) *Hardness tests* determine the steel's resistance to penetration. This characteristic is most commonly measured by the Brinell Test or the Rockwell Test. In the former, pressure is applied to the surface of a test specimen by means of a ball 10 mm in diameter. Two diameters of the resulting impression are measured and averaged; the average is converted to the hardness number by means of a conversion table. In the Rockwell Test, the degree of hardness is read on a gage; hardness is measured by the penetration of a diamond point or a 1/16-in. steel ball. Rockwell "C" scale readings are used in connection with the diamond point; "B" scale in connection with the steel ball. The "C" and "B" are the most commonly used of the several Rockwell scales.

(4) *Special additional tests* are often made on tubular and wire products. These include such items as hydrostatic and manipulating tests, and torsion and wrapping tests, the latter two being used only with wire.

The subject of testing and its relationships to the end uses of alloy steels has been given broad study by Bethlehem metallurgists. If you desire, they will be glad to discuss any phase of it with you, and also give unbiased opinions on such matters as analysis, proper selection of steels, machinability, etc. Call for their services at any time.

And when you need alloy steels, remember that Bethlehem furnishes the entire range of AISI standard analyses, as well as special-analysis steels and all carbon grades.

This series of alloy steel advertisements is now available as a compact booklet, "Quick Facts about Alloy Steels." If you would like a free copy, please address your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. *Export Sales:* Bethlehem Steel Export Corporation

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THE RESEARCH STORY BEHIND THIS AD

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Special zinc coating protects body parts against corrosion in the 1961 Ford Family of Fine Cars
Ford Motor Company builds better bodies
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2. Metallic Rich Paints
3. Plastic Coatings
4. Self Foaming Materials
5. Greases, Waxes, etc.

B — STEEL ALLOYS
1. Stainless Steel
2. Special Alloys

C — MORE UNUSUAL METHODS
(Such as vapor phase inhibitors, irradiated steels, forced ventilation, etc.)

D — METALLIC COATINGS
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2. Terne Plate
3. Tin Plate
4. Cadmium Plate
5. Zinc Coated
   A. Electrogalvanized
   B. Hot Dipped

Reprints of an extensive report on the Ford research program which culminated in their choice of Zinc are available on request from St. Joe.

The search for the best defense against corrosion was a major project with Ford Motor Company. A long and painstaking series of laboratory, road and production tests were scientifically conducted and evaluated before Ford named the winner—*galvanized steel.*

FORD EVALUATED THEM FOR

1. Corrosion Protection
2. Formability
3. Weldability
4. Painting
5. Method Employed (special requirements in applying, inspection, etc.)
6. Stock (and scrap) handling problems, if any
7. Cost

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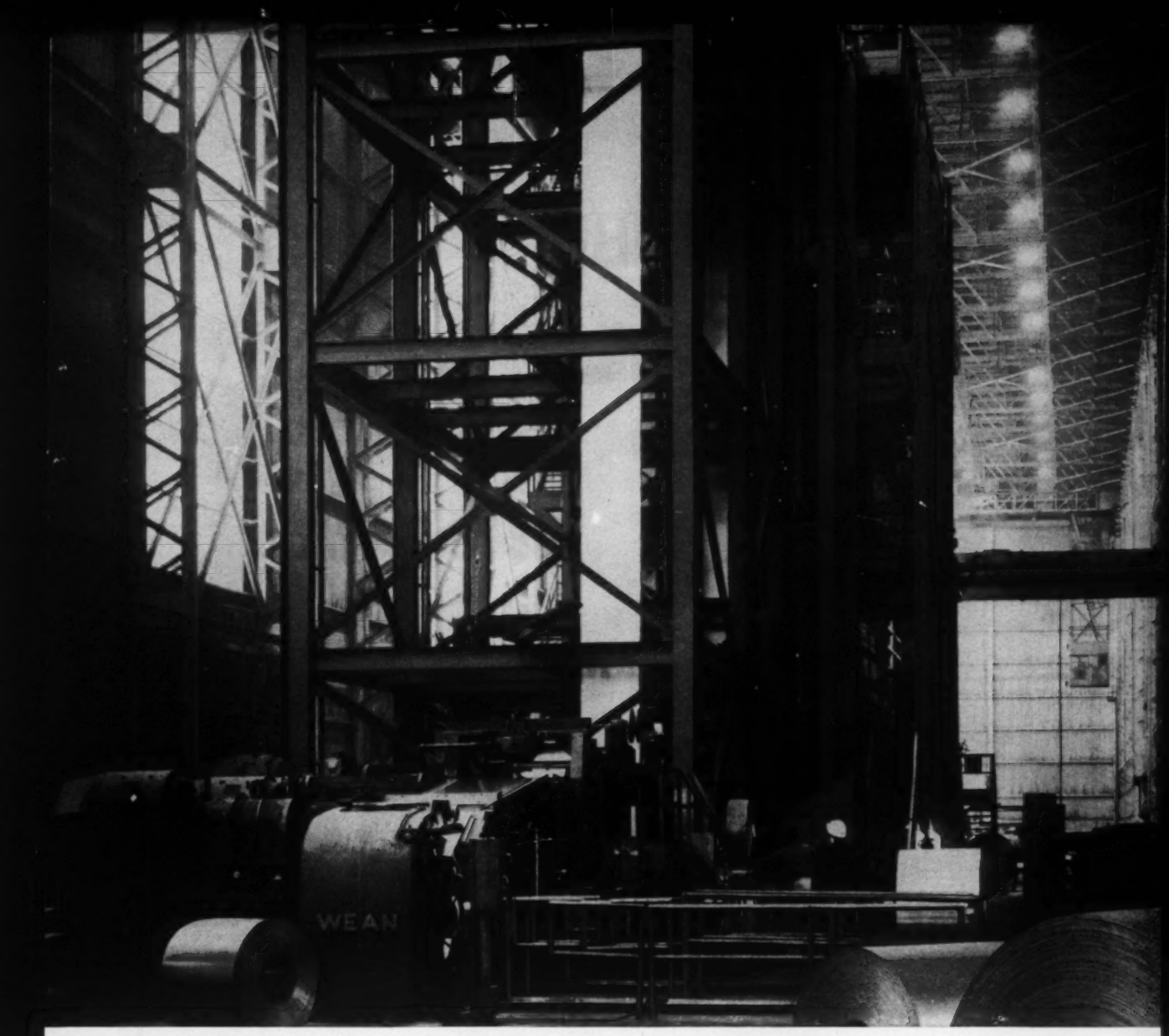


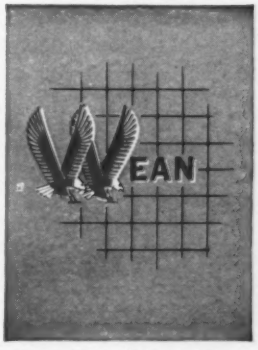
Kaiser Steel adds Wean Annealing Line in expansion of West Coast plant

This continuous tin plate annealing line marks the eighth Wean continuous processing facility installed at Kaiser Steel Corporation's Fontana, California plant, to service that company's customers for finished steels on the West Coast.

The Fontana line is capable of handling 30,000 lb. coils, with a maximum I.D. of 16½", and an O.D. of 66". Operating at speeds up to 1200 feet per minute, the new line can process strip from .006" to .015" thick, and from 18" to 38" wide.

Other Wean continuous processing equipment at Kaiser's Fontana plant includes a hot strip pickle line, two side trimming and recoiling lines, an electrolytic cleaning line, two electrolytic tinning lines, and a tin plate shearing line.

Wean's "creative engineering" can help you meet your customer requirements.



THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO

LOCTITE GIVES YOU

THE IMPOSSIBLE PERFECT FIT

Only a small percentage of the adjacent metal surfaces of a press or interference fit are actually in contact. Yet the security of the entire assembly depends on that small area of contact.

Rigid tolerances are specified, and extra machining operations are performed to increase the area of contact. Nevertheless, it has been impossible to mate two metal surfaces perfectly, one inside the other. The Perfect Fit, like Infinity and Perpetual Motion, has seemed to exist only in theory.

YET A FEW DROPS OF LOCTITE CAN NOW PROVIDE WHAT THE MOST EXPENSIVE OF MACHINING METHODS CANNOT.

LOCTITE Sealant is a penetrating liquid resin that by capillary action is drawn into all the voids in a press or interference fit, filling them completely. Once there, LOCTITE hardens automatically into a tough, solid, load-bearing plastic film, capable of supporting loads in excess of 25,000 pounds per square inch, thus providing *A PERFECT FIT* of adjacent surfaces.

FACTS ABOUT LOCTITE SEALANT:

- LOCTITE is easy to use. It requires no mixing or heating.
- LOCTITE is 100% active. It totally fills the voids in press fits and threaded assemblies.
- LOCTITE contains no solvents—requires no solvents. There is no hardening shrinkage due to solvent evaporation.
- LOCTITE requires no expensive equipment. The bottle is the applicator; or mass application procedures can easily be set up with "around-the-shop" parts and materials.
- LOCTITE will withstand temperatures up to 300°F.

LOCTITE Sealant makes a slip fit as strong as a press fit, a press fit stronger. It can be used to relax tolerances and to improve reliability.

Wherever metals are LOCKED—RETAINED—SEALED there is an opportunity to cut costs and increase profits with LOCTITE. Details on your application bring immediate response from our Application Engineering Department. Write today.

LOCTITE® SEALANT

AMERICAN SEALANTS COMPANY
257 North Mountain Road • Hartford 11, Connecticut

Steelmaker

U. S. Steel Corp. has put one of its blast furnaces on automatic feeding. Associate Editor Neil Roberts writes all about it on Page 68.

Besides being the proprietor of our "Progress in Steelmaking" section, Neil authors many other articles, most of them in the technical area.

He joined us in 1958 after industrial experience as a technical writer with Clevite Corp.'s Brush Instrument Div. and Twin Coach Co., plus teaching experience in several Ohio schools. A graduate of Eastern Kentucky State College, he earned his M. Ed. degree from Kent State University (Ohio).

Neil and his wife are the proud (aren't they all?) parents of month-old Amy Jo.

Automation Makes More Jobs

Automation is America's biggest jobmaker, not the ominous threat to employment that many union leaders and others claim. So, to create more jobs, we need more automation, not less.

That's the thesis of STEEL's next impact issue, Sept. 4. A team of ten editors has been working on the special report since May. The regular format for the issue will be discarded, and we'll bring you a 40 page survey in depth on automation and its effects on jobs.

The Sept. 4 study will be the editors' fourth Impact Issue, a new kind of business paper reporting. The others appeared Sept. 5, 1960 (on foreign competition), Jan. 2, 1961 (on revitalizing people power), and on Apr. 17, 1961 (on price fighting).

Incidental Intelligence

Geraldine, our cleaning woman and night editor, has been busy in the editors' wastebaskets again and has come up with these gleanings:

Item: An official U. S. exhibit being prepared for a West Berlin trade fair will include a demonstration of glass fiber shoes for walking on water. The 3 ft pedal pontoons will be worn by a guide while explaining a floating display of sports and commercial boats.

Item: A long, thin dachshund drags measuring tapes from manhole to manhole for engineers taping pipelines for the Los Angeles Flood Control District. The dog increased production 75 per cent.

Item: The best turtle soup comes from turtles fed on champagne and oysters.

Error in Arithmetic

In our July 17 issue (p. 84) in a Program for Management article, "Invent for Profit Growth," we reported that J. S. Sayre, chairman of Norge Div., Borg-Warner Corp., said "Jesus was 8½ per cent wrong when he picked his 12 apostles."

"My figuring says Jesus was 8⅓ per cent wrong," claims G. A. Rideout of Pittsburgh. Our old friend, Charlsie of General Steel Industries Inc., also points out the error and adds: "We trust this will be remembered on Judgment Day."

Sardonic Mottos

They keep pouring in. Here are some more:

"Time—the stuff between pay days."—submitted by Charlsie of General Steel Industries Inc.

"The fellow who thinks he knows it all is *especially* annoying to those of us who do."—submitted by American Cyanamid Co.

"When easy does it, somebody usually has to do it over again."—sumitted by Lt. Col. Rolland F. Fetters of Tinker Air Force Base, Okla.

"Don't relax now, the job is only half balled up."—submitted by Carl H. Young of Bonney Forge & Tool Works.

"All I want is an unfair advantage."—submitted by Sol Goldin of Whirlpool Corp. He also sends these in, which came to him anonymously—"I have as much fun as normal people" and "How did this company ever grow before it hired me?"

Addendum on Swimming Pools

Robert S. Greene, executive secretary of the National Swimming Pool Institute, has this to say about our "$20 Billion Leisure Market" story (July 24, p. 65):

"Your coverage of the growing leisure market was excellent. But I would add one important use of steel which you omitted. Although it's true that only a small percentage of pools constructed are entirely of metal, nearly a ton of steel goes into the average pool constructed of concrete. In 1960, some 34,000 concrete pools went into the nation's backyards."

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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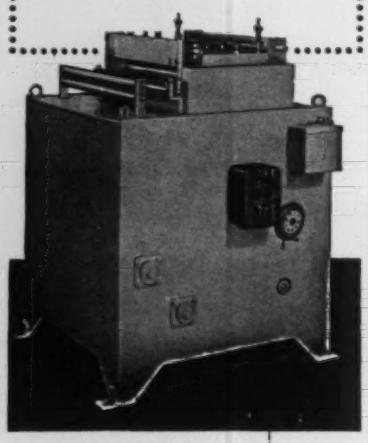

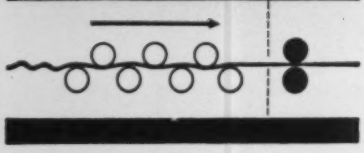

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Fluid Power news

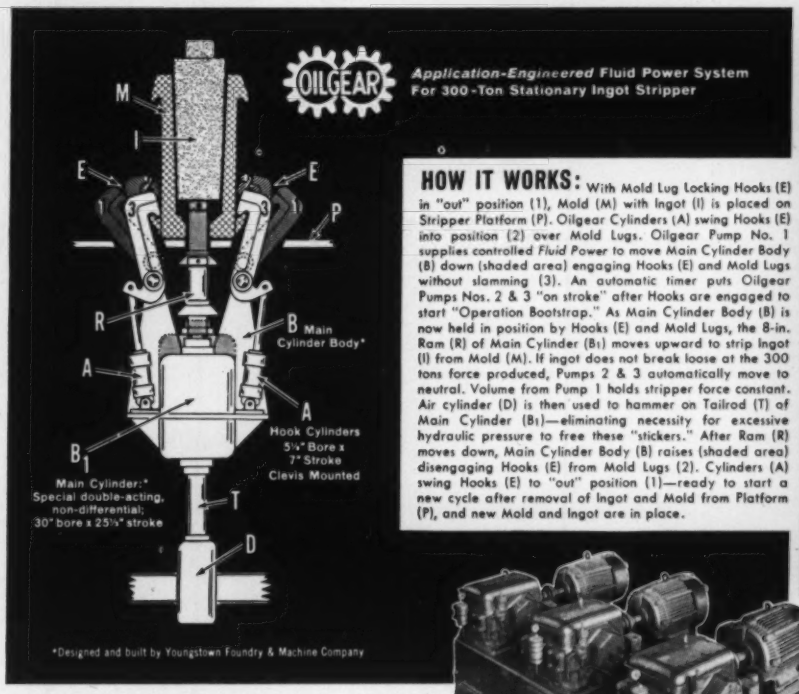
REPORT NO. 11,804 OILGEAR POWERED INGOT STRIPPER

From Oilgear *Application-Engineering* Files

HOW OILGEAR HEAVY-DUTY SYSTEM SIMPLIFIES POWER AND CONTROL OF 300-TON STATIONARY INGOT STRIPPER—HELPS ELIMINATE MAINTENANCE DOWNTIME

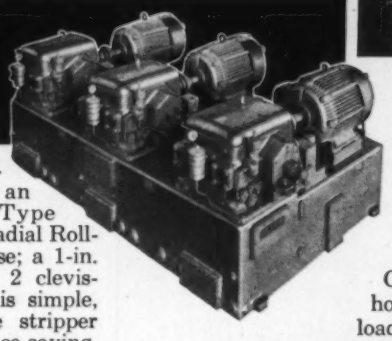
DATA: To replace a mechanical-type ingot stripper because of considerable maintenance downtime caused by dirt and foreign particles jamming the motor-driven ram screw—necessitating disassembly of the entire mechanism to free the threads. A hydraulically-powered, floor-mounted stripper design was approved as most convenient for the big-end-up molds used in this particular operation—would provide faster, easier maintenance accessibility at lowest over-all initial replacement cost.

Basic Power and Control Requirements: 1. Simplicity, and trouble-free, rugged dependability. 2. To be capable of many years of heavy-duty, rapid, 'round-the-clock operation with an absolute minimum of maintenance. 3. Must be: impervious to sand, scale, heat; compact; thrifty on electrical power input, wiring, installation downtime, floor space; completely free, if possible, from maintenance-provoking belts, chains, relays. 4. One source and responsibility for power and control systems preferred.



HOW IT WORKS: With Mold Lug Locking Hooks (E) in "out" position (1), Mold (M) with Ingot (I) is placed on Stripper Platform (P). Oilgear Cylinders (A) swing Hooks (E) into position (2) over Mold Lugs. Oilgear Pump No. 1 supplies controlled *Fluid Power* to move Main Cylinder Body (B) down (shaded area) engaging Hooks (E) and Mold Lugs without slamming (3). An automatic timer puts Oilgear Pumps Nos. 2 & 3 "on stroke" after Hooks are engaged to start "Operation Bootstrap." As Main Cylinder Body (B) is now held in position by Hooks (E) and Mold Lugs, the 8-in. Ram (R) of Main Cylinder (B_1) moves upward to strip Ingot (I) from Mold (M). If ingot does not break loose at the 300 tons force produced, Pumps 2 & 3 automatically move to neutral. Volume from Pump 1 holds stripper force constant. Air cylinder (D) is then used to hammer on Tailrod (T) of Main Cylinder (B_1)—eliminating necessity for excessive hydraulic pressure to free these "stickers." After Ram (R) moves down, Main Cylinder Body (B) raises (shaded area) disengaging Hooks (E) from Mold Lugs (2). Cylinders (A) swing Hooks (E) to "out" position (1)—ready to start a new cycle after removal of Ingot and Mold from Platform (P), and new Mold and Ingot are in place.

ABOVE: Oilgear-equipped Ingot Stripper "in action"—Mold Lug Locking Hooks (E) indicated. A 10,000-lb. ingot has just been "stripped" from the mold. Hooks (E) will be disengaged as soon as stripper ram is retracted.



LEFT: Oilgear Heavy-Duty "Power-Pak"—consisting of 3 Oilgear Type "DX-60" Variable Displacement, Two-Way Pumps on a single reservoir base used on this installation—is remotely located, isolated from heat and gritty particles present in the stripping area.

SOLUTION: An *Oilgear Application-Engineered Heavy-Duty System* consisting of an Oilgear "*Power-Pak*" incorporating 3 Type "DX-60" Variable Displacement, 2-Way, Radial Rolling Piston Pumps on a single reservoir base; a 1-in. solenoid-pilot-operated 4-Way Valve; and 2 clevis-mounted Hook Cylinders (A, above). This simple, direct-acting, locked-circuit, push-up-type stripper with remote speed and cycle control . . . space-saving, remotely located "*Power-Paks*" . . . automatic pressure and flood lubrication with continuously filtered power fluid . . . positive, automatic overload protection—has eliminated maintenance downtime problems encountered with the previous mechanical stripper. Long life for continuous, 'round-the-clock production is assured by this automatic, "*Sealed-System*"—aided by the direct application of the pneumatic jarring cylinder to free "frozen" ingots. Lower installation cost, faster—easier accessibility for preventive maintenance are but two additional advantages of this Oilgear-equipped ingot stripper. USER STATES—"*Oilgear was selected because of its simplicity, and the trouble-free, long-life performance record of other Oilgear-equipped machines in our plants.*"

With Oilgear Heavy-Duty System Components designed for thousands of hours of continuous service at full rated load, savings are compounded with every hour of uninterrupted performance. That's why machinery and equipment manufacturers and *their* customers say . . .

"for the lowest cost per year . . . it's Oilgear!"

For solutions to YOUR linear or rotary Controlled Motion problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements directly to . . .

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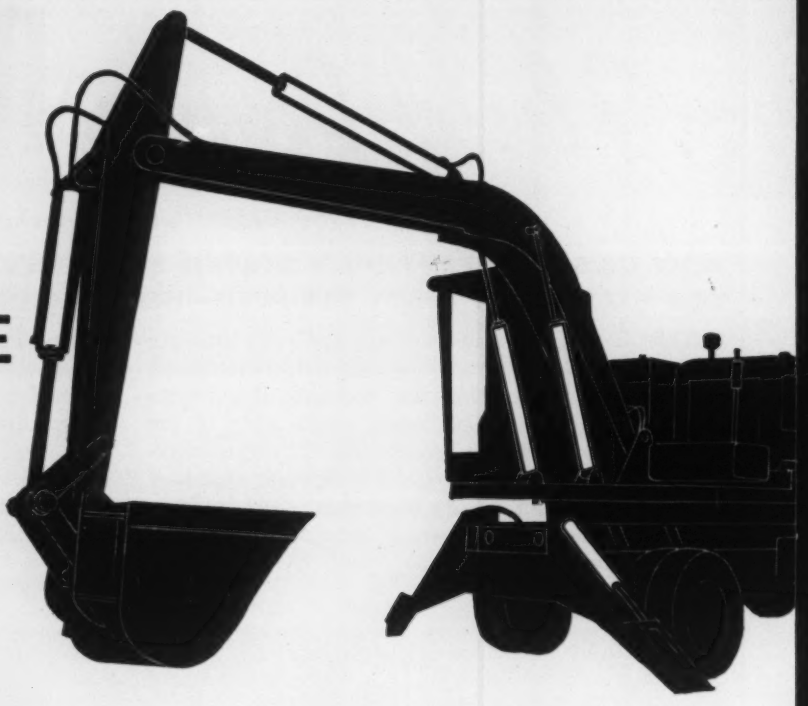
Save on machining

Republic ELECTRUNITE Special Smooth I.D. Hydraulic Cylinder Tubing



the tubing that can often be delivered as a finished part

Precision controlled wall thickness with uniform concentricity makes ELECTRUNITE Special Smooth I. D. a finished part ready for use without machining in many hydraulic applications.

Because you can order ELECTRUNITE in exacting wall thicknesses, there's no need to pay for extra metal which may ultimately be machined away.

Only selected quality flat rolled steel is used in making ELECTRUNITE Special Smooth I.D. Hydraulic Cylinder Tubing. Thickness of this steel is precisely controlled in rolling, assuring uniform wall thickness of the finished tubing.

All tubing is welded by the exclusive ELECTRUNITE process *without addition of extra metal*, assuring that the weld area is of the same chemistry as the rest of the tube. In the processing, lengths of tubing are normalized in a controlled atmosphere furnace, completely recrystallizing the weld area to provide a uniformly ductile tube.

Tubing is drawn through a ring die and over a highly polished mandrel, attaining exacting I.D. and O.D. tolerances as well as a dense I.D. surface finish.

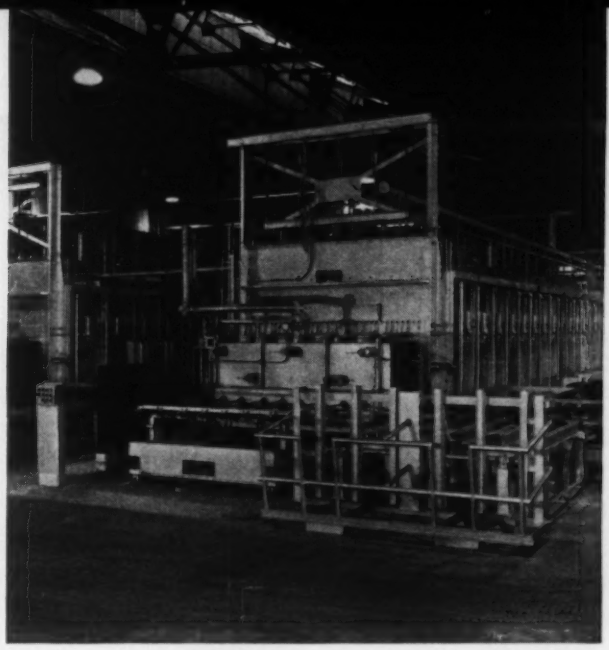
Standard I.D. tolerances are closer than those shown for tubing made by other processes. When necessary, tolerances can be maintained to 50% closer than standard.

For full information on Republic ELECTRUNITE Special Smooth I.D. Hydraulic Cylinder Tubing, Republic Hydraulic Fluid Line and Mechanical Tubing contact your Republic representative or write direct.

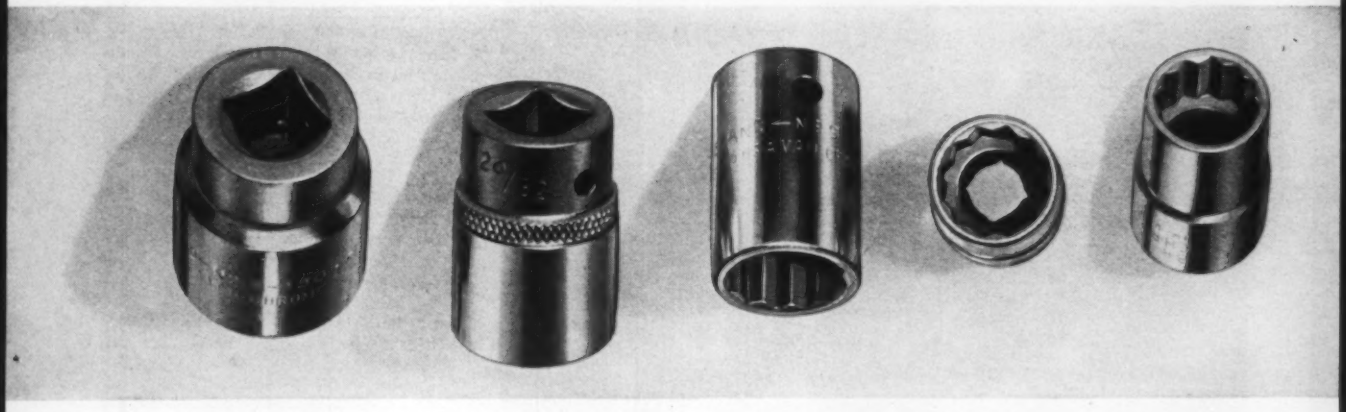
Strong, Modern, Dependable

Steel

COMPLETE FOUNDRY ENGINEERING SERVICE is available without obligation to all foundries. Republic Foundry Service Engineers are thoroughly qualified to assist you in every operation. They recommend, from industry's most complete line of merchant pig iron, the grade best suited to your requirements, equipment, and specifications. Write for a call by a Republic Foundry Service Engineer.



STEEL FOR COLD EXTRUSION, supplied in heavier coils weighing up to 1600 pounds is produced in Republic's New 11" Chicago Bar Mill. Atmosphere controlled continuous annealing furnaces can anneal, normalize, or spheroidize to your precise requirements. The cold extrusion process virtually eliminates raw waste material. Standard equipment may be available to minimize your re-tooling costs. Mail coupon for data.



WRENCH SOCKETS, made by Herbrand Division of The Bingham-Herbrand Corporation, Fremont, Ohio, illustrate the kind of application where the superior strength, toughness, and machinability of *Republic Cold Finished Alloy Bars* help produce a better product at lower cost.

Bars are formed, drilled, and cut off in an automatic screw machine, then hot broached to shape internal dimensions. Final stages of socket production include heat treat and chrome plating. Mail coupon for more data on Republic Alloy Bars.

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REPUBLIC STEEL CORPORATION
DEPT. ST-2576
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on the following products:

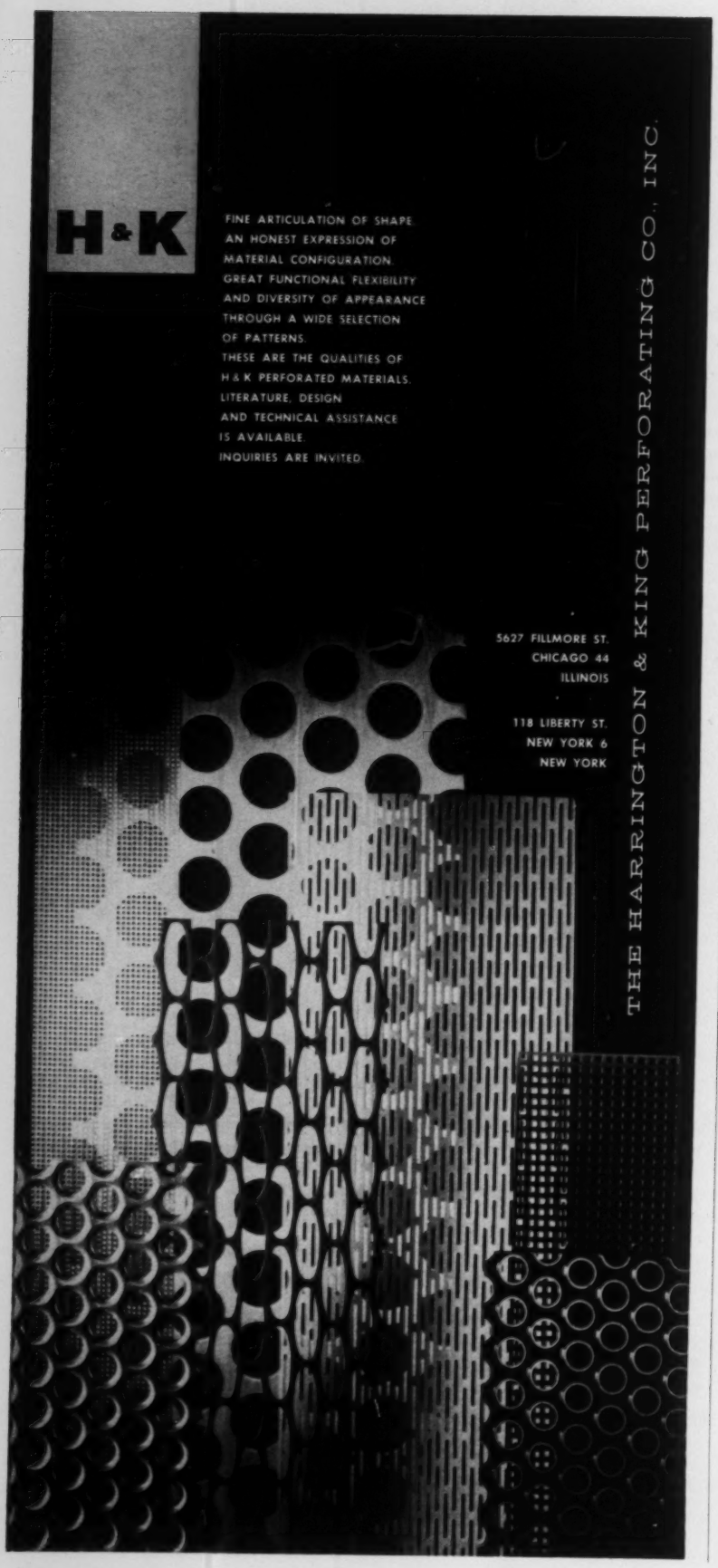
- ☐ ELECTRUNITE® Special Smooth I.D. Hydraulic Cylinder Tubing
- ☐ Republic Steel for Cold Extrusion
- ☐ Republic Alloy Steel
- ☐ Republic Pig Iron and Foundry Service

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____



CALENDAR

OF MEETINGS

Aug. 22-25, Western Electronic Show and Convention: Cow Palace, San Francisco. Convention director: Calvin K. Townsend. Business office: 1435 La Cienega Blvd., Los Angeles 35, Calif. Northern California office: 701 Welch Rd., Palo Alto, Calif.

Sept. 10-12, Steel Service Center Institute: Great Lakes regional meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive vice president: Robert G. Welch.

Sept. 11-12, American Supply & Machinery Manufacturers' Association Inc.: First Industrial Distribution Conference, Statler Hilton Hotel, Cleveland. Association's address: 2130 Keith Bldg., Cleveland 15, Ohio.

Sept. 11-15, Instrument Society of America: Annual Instrument-Automation Show, Memorial Sports Arena, Los Angeles. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

Sept. 14-16, Packaging Machinery Manufacturers Institute: Annual meeting, The Homestead, Hot Springs, Va. Institute's address: 60 E. 42nd St., New York 17, N. Y. Executive director: Russell L. Sears.

Sept. 17-21, Non-ferrous Founders' Society: Annual meeting, Shawnee Inn. Shawnee-on-Delaware, Pa. Society's address: 1604 Chicago Ave., Evanston, Ill. Executive secretary: Herbert F. Scobie.

Sept. 18-20, Standards Engineers Society Inc.: Annual meeting, Hotel Sherman, Chicago. Society's address: Box 281, Camden 1, N. J.

Sept. 19, Electric Overhead Crane Institute, Inc.: Meeting at Palmer House, Chicago. Institute's address: 1 Thomas Circle, Washington 5, D. C.

Sept. 24-26, Steel Founders' Society of America: Fall meeting, The Homestead, Hot Springs, Va. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Sept. 24-28, Pressed Metal Institute: Annual meeting, Grand Hotel, Point Clear, Ala. Institute's address: 3673 Lee Rd., Cleveland, Ohio. Managing director: J. D. Keith.

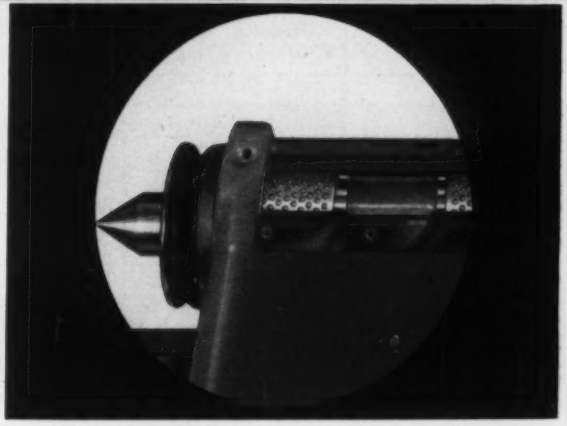
Sept. 25-28, Association of Iron & Steel Engineers: Annual convention, Penn-Sheraton Hotel, Pittsburgh: Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Landis loaded ball spindle footstock gives lasting shake free work support

- for dependable operation year after year
- gives rounder work, faster sparkout
- footstock stability now equal to headstock stability
- standard equipment on Landis Type R plain grinders

Landis 6" x 36" R plain grinder with 30° angular wheelhead, Truform dresser and hand traverse.

Cutaway view shows loaded ball spindle construction of new footstock. Another exclusive feature of Landis R plain grinders.



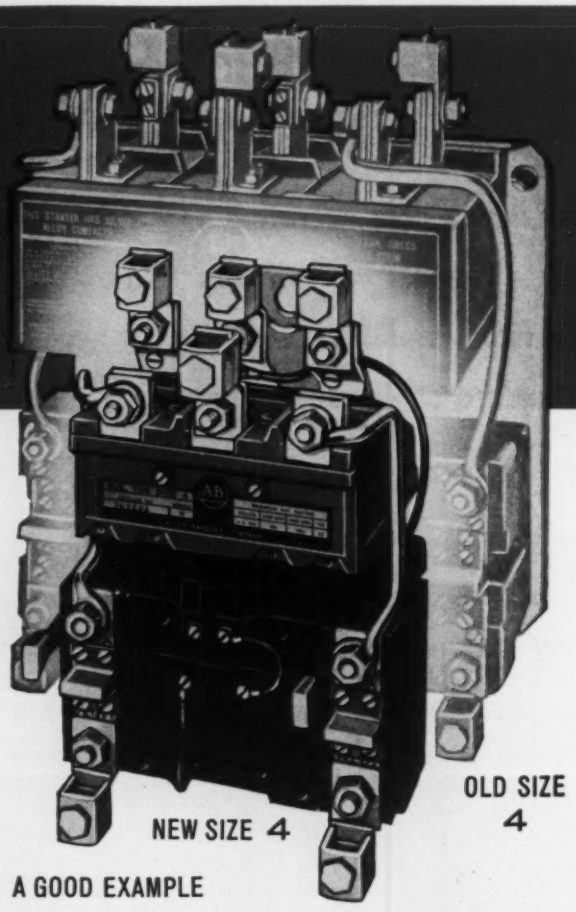
LANDIS

LANDIS TOOL COMPANY, WAYNESBORO, PA.

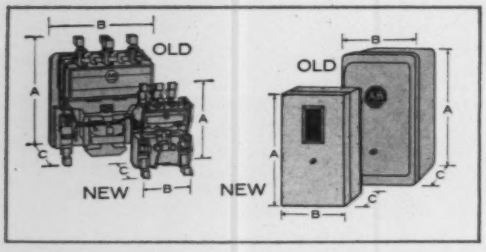
You get BIGGER PERFORMANCE

Plus SMALLER SIZE

with the new Allen-Bradley Bulletin 709 Starters



A GOOD EXAMPLE



The new revolutionary Bulletin 709 motor starters are surprisingly small in size—yet, they are good for many more millions of operations—without trouble or maintenance! Rating for rating, they have no equal. They are today's best starter value—and they cost no more!

The "Quality" you've come to expect in all Allen-Bradley control is represented in all details—especially in the "eye appealing" enclosures styled by the world famous industrial designer, Brooks Stevens. Write today for details of the new Bulletin 709 line—the greatest advance in motor control in 30 years: *Allen-Bradley Co., 1320 South Second Street, Milwaukee 4, Wisconsin.*

Check These New SPACE-SAVING Dimensions

Starter Size	OPEN TYPE STARTERS						NEMA 1 ENCLOSURES					
	Height A		Width B		Depth C		Height A		Width B		Depth C	
	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
00	4 1/8	—	3 7/8	—	3 11/16	—	7 11/16	—	4 7/8	—	4 1/2	—
0	5 7/8	5 5/8	4 1/8	4 3/4	3 11/16	3 1/4	9 3/16	7 7/8	6 5/16	5 5/8	4 5/8	4 1/4
1	6 5/8	5 7/8	4 5/8	5	3 11/16	3 1/4	10	8 13/16	6 13/16	6 3/8	4 5/8	4 1/4
2	7 5/8	10 1/16	4 5/8	5 3/4	3 11/16	4 7/32	12	14 1/2	7 5/8	9	4 5/8	5 7/16
3	10 1/4	12 5/8	6 1/4	7 1/4	5 7/32	5 7/16	16 5/8	19 1/2	10 3/8	11 3/8	7 1/4	6 11/16
4	11 5/8	16 1/4	7 3/8	12 3/4	6 7/8	6 13/16	22	26 9/16	11 5/8	14 3/16	8 1/4	7 11/16
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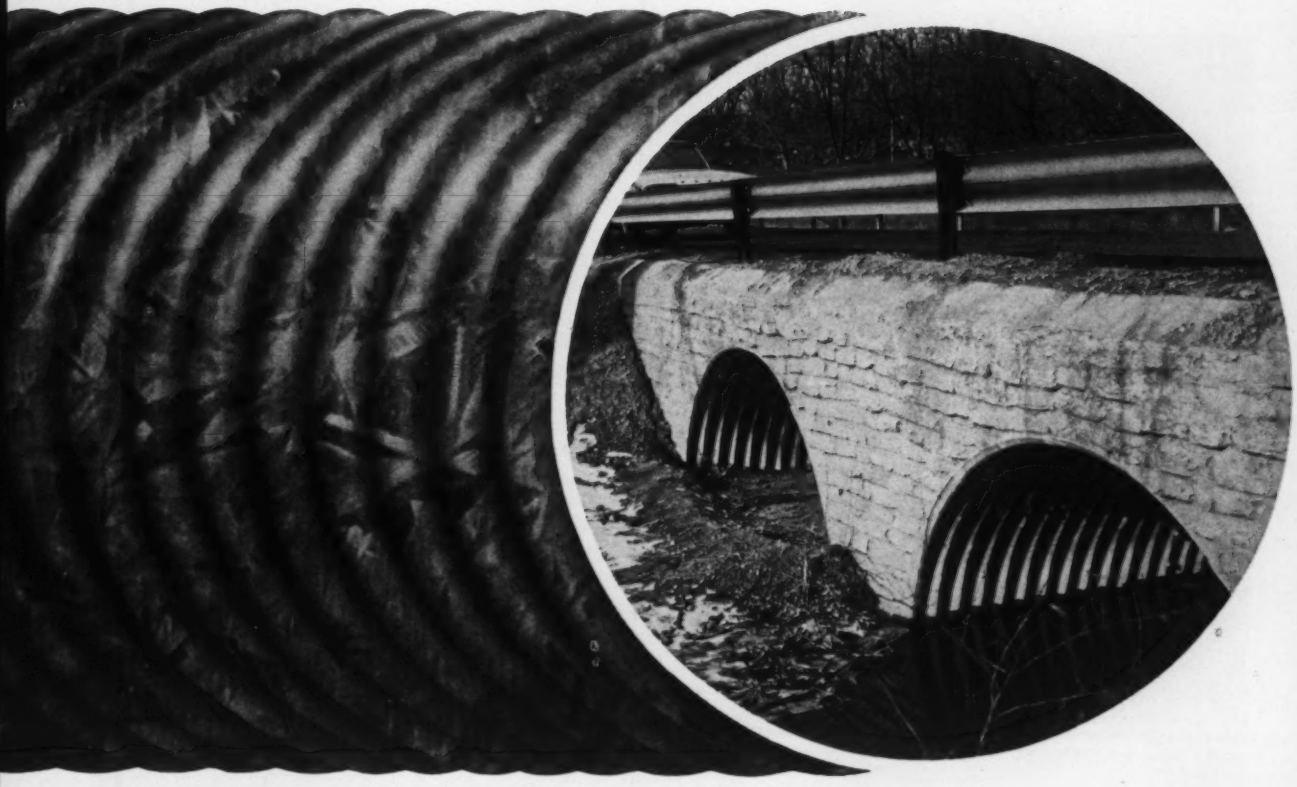
ALLEN-BRADLEY

QUALITY MOTOR CONTROL

Guardrails and culverts live longer . . .



GUARDED BY GALVANIZED STEEL

Wherever traffic or drainage flows, you'll find modern galvanized steel at work. In guardrails, for example, where nothing quite matches galvanized steel: the strength of the steel for impact; the coating of zinc for durability and ease of maintenance; the economy of the combination. And in culvert pipes, where the exceptionally high strength-weight ratio of this zinc-coated metal brings cost per year down to the barest minimum.

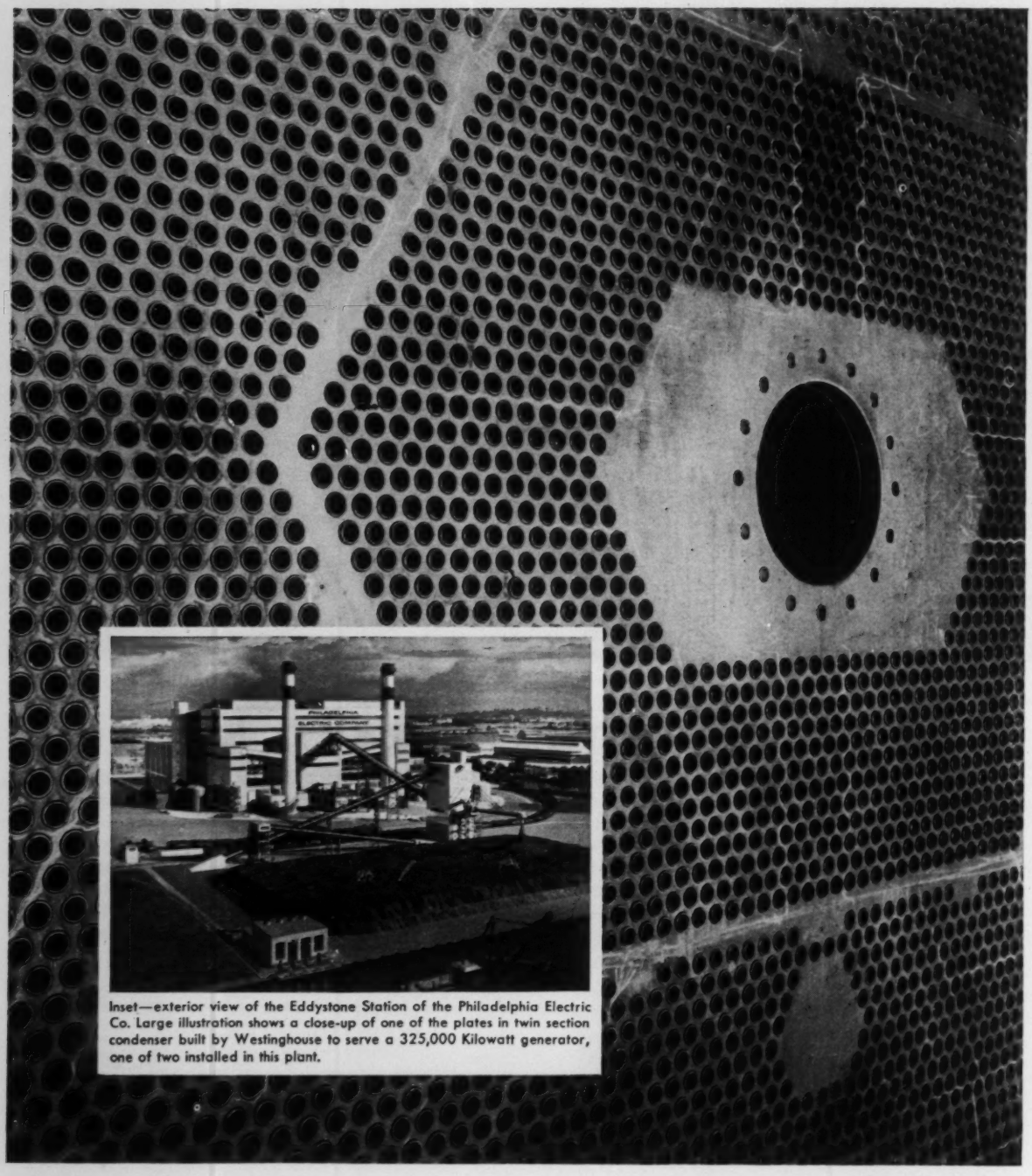
WEIRKOTE® IN PARTICULAR—You gain when you specify long-life galvanized steel for guardrail and culvert installations. And you gain even more when you specify National Steel's Weirkote. To the inherent strength of steel, Weirkote adds *enduring* zinc protection. Weirkote is manufactured by two National Steel divisions, Weirton Steel and Midwest Steel. For further details, write Weirton Steel Co., Weirton, West Virginia.

MIDWEST STEEL
Portage, Indiana

WEIRTON STEEL
Weirton, West Virginia

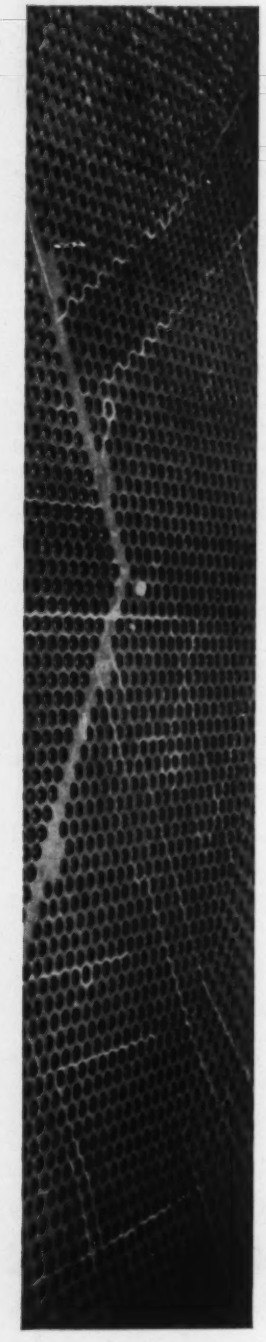
Divisions of
NATIONAL STEEL CORPORATION

New Temperature and Pressure Generator—Using 162 Tons



Inset—exterior view of the Eddystone Station of the Philadelphia Electric Co. Large illustration shows a close-up of one of the plates in twin section condenser built by Westinghouse to serve a 325,000 Kilowatt generator, one of two installed in this plant.

Records Set by Steam Turbine of Revere Condenser Tubes



Westinghouse-Built Twin Section Condenser Installed at Eddystone Station of the Philadelphia Electric Co.

No. 1 steam turbine-generator in the new Eddystone Station of the Philadelphia Electric Company is setting new records for pressure and temperature with initial steam throttle conditions of 5000 psi and 1200°F.

Helping to assure this efficiency is a 150,000 sq. ft. surface condenser . . . equipped with over 162 tons of Revere Tubes. In the main condenser area, 23,075 Revere Admiralty Tubes—¾″ O.D. x 18 BWG x 30′ long are used. Because of ammonia in the exhaust steam, the air cooling section uses Admiralty Bi-Metal Tubes. In this section of the Westinghouse Surface Unit, 2,745 tubes are installed, Type 316 welded stainless steel, .024″ wall, drawn over Admiralty with an .025″ wall.

Here at Eddystone, as in so many generating plants, varying operating conditions call for specific types of tubes best-suited to meet the specific conditions. Revere, with its wide experience in these matters, was called upon to recommend the proper type of tubes.

This same wide choice of materials and construction, combined with unequalled experience, makes Revere your best source of tubes for original equipment or replacement. Why not put this knowledge and the Industry's widest line of tube types and materials to work before you make the final selection of tubes and plates for your equipment? You can bring them to bear on your problems by calling the nearest Revere Sales Office.

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COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

Executive Offices: 230 Park Avenue, New York 17, N. Y.

Mills: Rome, N. Y.; Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles, Riverside and Santa Ana, Calif.; New Bedford and Plymouth, Mass.; Brooklyn, N. Y.; Newport Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities.

Distributors Everywhere

INTEGRAL FINNED TUBE • BIMETAL TUBE • DUAL GAUGE TUBE • INSTRUMENTATION TUBE • CONDENSER TUBES IN CUPRO-NICKEL, ALUMINUM BRASS, ADMIRALTY, HERCULOY (Silicon Bronze), ARSENICAL COPPER, MUNTZ METAL AND OTHER ALLOYS • ALUMINUM TUBE, SHEET AND EXTRUSIONS • SMALL AND LARGE PLATES IN CUPRO-NICKEL, COPPER, HERCULOY, MUNTZ METAL, NAVAL BRASS AND ADMIRALTY • LOW CARBON STEEL HEAT EXCHANGER TUBE TO ASTM SPEC. A-214 AND A-334 GRADE "C" • BOILER TUBE TO ASTM SPEC. A-178.

ONE KEY TO COST CONTROL

Savings like these through Metalogics*

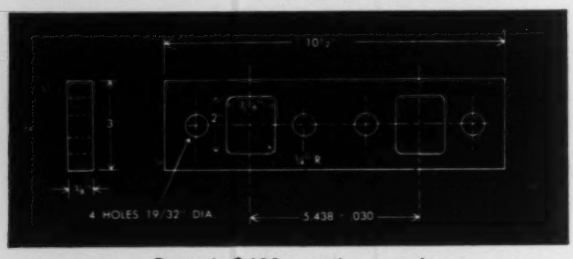
Look at these random examples and see how Ryerson Metalogics sparks real savings for hundreds of companies—in helping to search out new materials, new methods, new machines that will do the job better.

You can count on Ryerson for practical, unbiased recommendations because we offer you:

1. Exceptional knowledge of metals and their characteristics, gained through a century of service to industry as a supplier of metals and machinery for metal fabrication.
2. The nation's largest stocks of steel and aluminum —plus unsurpassed service on industrial plastics.

Your Ryerson representative is "Metalogics-trained" to help you value-analyze selection, fabrication and application problems. Get his constructive ideas soon, and see how he can help you select and apply material from our vast stocks. It's the "Metalogical" thing to do.

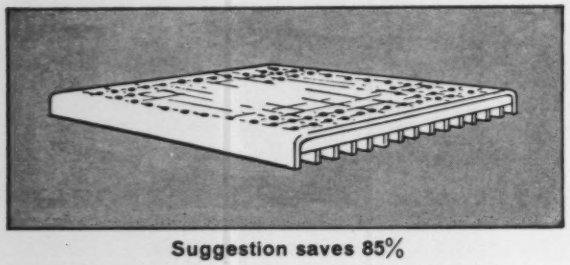
**The Ryerson science of giving optimum value for every purchasing dollar.*



Saved: $100 per thousand

PROBLEM: Muffler manufacturer required accurately finished mounting plates made from ⅜" x 3" bar. Cutting bars to size, burning 1¼" x 2" holes and drilling four 19/32" holes proved time-consuming and expensive.

SOLUTION: Ryerson recommended that they eliminate cutting, burning and drilling operations by stamping the part from Ryerson forming-quality plate. One operation instead of three cut costs $100 per thousand pieces and quickly justified the small initial investment in dies.



Suggestion saves 85%

ASKED FOR: Customer wanted 1" hot rolled plate to cover about 80' of 24" open trench. Plate was to be cut into 24" x 27" segments—each containing 900 ⅜" holes to filter the product.

RECOMMENDED: After studying application and costs, Ryerson recommended a design combining perforated light plate, formed to channel shape, and grating for structural support. Ryerson's experience and imagination saved 85% of the original cost.

Machine cut rings solve problem

PLATES REQUESTED: Ryerson was asked to bid on supplying ¼" Type 410 stainless in 27½" square plates. Material was to be used for orifice plates for 16" burner, subjected to elevated temperatures.

RINGS RECOMMENDED: Going beyond material specs, the Ryerson representative found that the customer intended to cut plate into 27⅛" diameter length with 13.120" bore—and then mill 12 slots in outer diameter for expansion relief. Knowing the application, Ryerson recommended supplying machine-cut rings in which slots could then be punched rather than milled. Production savings enabled switching to Type 304 at less cost than Type 410 with slots milled.

2 metalworking machines for the price of 1

A fabricator of stainless steel kitchen equipment was recently in the market for a new squaring shear. The one under consideration had a gap-type frame which would enable him to do an important notching operation—necessary for certain sink tops. After careful study, a Ryerson machinery specialist recommended *two* pieces of equipment instead of one at no increase in total cost. The first, an under-driven shear. The second, a universal-type sheet metalworking machine that would do the required notching, plus many other jobs—adding versatility to the entire operation.

Production upped 30%

BEFORE: Job shop was using MT 1015 tubing in the manufacture of this coupling. Machinability was satisfactory, but rising costs of operation led to a search for ways to economize.

AFTER: Careful study by the Ryerson representative brought about a change in material. He recommended using Ledloy® 170 tubing, which increased machining speed to 170 sfm and stepped up production 30%. Ryerson's stocks include the widest range of fast-machining alloys.

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RYERSON STEEL®

Joseph T. Ryerson & Son Inc., Member of the INLAND® Steel Family

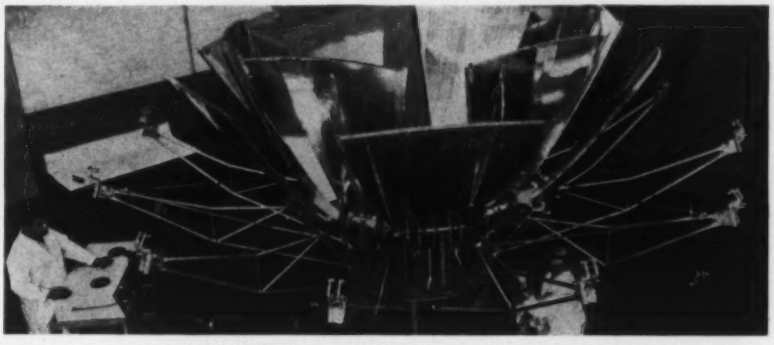
Steelmakers Must Raise Prices, Says J&L Chairman

The steel wage increase coming up Oct. 1 must be met by a price increase or reduced earnings, says Avery C. Adams, chairman, Jones & Laughlin Steel Corp. He points out that only 4 of the 8 largest steelmakers covered their dividends from first half, 1961, operations. And he says, "If this industry is going to solve its problems, it must do considerably more from an earnings standpoint than just cover its dividends." His solution: Increase prices so that earnings will cover needed capital spending.

July FRB Index Sets Record

The Federal Reserve Board index of industrial production jumped to a record 112 per cent of the 1957 average last month. Widespread gains in industrial activity in July pushed the index over the 111 per cent peak of January, 1960. The reading for the previous month and the year ago July was 110.

Space Flower Will Put Sun's Energy to Work



General Electric Co.'s giant flower may bloom aboard a spacecraft or satellite. Its petals fold compactly for atmospheric flight. In full bloom, it becomes a parabolic mirror, concentrating solar energy for conversion into electricity.

International Trade Trends

Australian firms are looking for license agreements and technical aid to expand production of cutting type machine tools, castings, and heat treating . . . Dakar, Senegal, will be the site of a general international trade fair Jan. 12-26, 1962 . . . U. S. producers of welding equipment are being asked to exhibit at the Trade Fair of Welding and Cutting in Dusseldorf Sept. 3-10 . . . Port-de-Bouc, France, is developing a 400 acre industrial park on its outskirts and is seeking U. S. plants to locate there . . . On June 10, Italy had 2,480,000 TV subscribers, an increase of 356,000 since Jan. 1 . . . Nippon Aluminum Industrial Co. Ltd. has announced plans to build a stainless

steel production facility in Isehara, Japan . . . The International Bank for Reconstruction & Development is loaning $35 million to assist India in boosting its coal production from 54.6 million tons to 97 million tons by 1966.

What the Space Program Means to You

Watch the multibillion dollar space programs of the National Aeronautics & Space Administration. They could be the genesis of much of our future technology—new metals, alloys, chemicals, and as yet unheard of techniques for machining, brazing, welding, and forming. Even refined management techniques may emerge from the work. For a look at the challenges and opportunities which the space programs present, see the story beginning on Page 29.

Mamula's Appeal to USW Local Blocked

Nicholas Mamula's request for a special meeting of United Steelworkers Local 1211 to reconsider his ouster as president (STEEL, Aug. 14, p. 18) has been ruled out of order by USW District 20 Director Kay Kluz. The case is being appealed to the 33-man international executive board.

How to Improve Your Heat Treating

Everybody can get into the act when it comes to making mistakes in heat treating. Many of the problems can be avoided before a workpiece ever reaches the heat treating stage. The part shown in the photo at right has been heat treated properly because attention was given to design, material, and method. The story on Page 60 tells how you can eliminate costly failures and improve the quality of heat treated parts via planning.

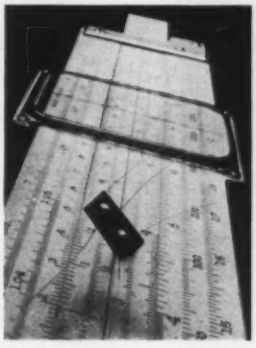
Construction, Primary Metals Industry Increase Jobs

The Department of Labor reports employment in construction increased 100,000 during July, exceeding the normal seasonal rise. Durable goods manufacturing resisted seasonal declines and the primary metals industry showed a gain. The number of nonfarm jobs added since March (1.25 million beyond the normal seasonal rise) equals the number cut back from the July, 1960, peak during the recession.

Soviet Universities Pay Top Dollar for Scientists

Soviet industry has a problem which hasn't threatened its U. S. counterpart. Scientists and technologists are being lured to universities because they offer three to four times as much pay. The organization of scientific labor has stirred pleas from the Soviet press for better co-operation between universities and industrial research laboratories.

They're Both 'Slide Rules'



Although these slide rules are nothing alike in the way they operate, both perform the mathematical functions of multiplication and division in the same basic way: Via logarithms. The silicon wafer is really a "molecular slide rule," say the scientists at Westinghouse Electric Corp. who developed the unit. It functions on the principle of molecular electronics—by rearranging the internal structure of a solid semiconductor crystal.

Consumers Appear Ready to Increase Spending

The Federal Reserve Bank of Chicago notes the favorable spending position of consumers via indicators: The reduction of installment debt by $1.2 billion since the first of the year, the high rate of personal saving, and the record level of personal income.

Material Handling Equipment Makers See Upturn

"All phases of our industry showed gains in June," says Robert F. Moody, president, Material Handling Institute Inc. Although bookings for the first half were 2.5 per cent below those for the like 1960 period, the industry's business made strong gains in May and June. Outlook: 1961 may be a better year than 1960.

Executives Urged to Visit Foreign Markets

"Go abroad and study at first hand the market situations, the sources of supply, and the investment possibilities," Edwin A. Locke Jr., president, Union Tank Car Co., urges U. S. executives. Lamenting the fact that only 4 per cent of U. S. manufacturers are selling abroad, Mr. Locke believes personal visits would impress executives with the importance of the potential markets springing up abroad. "Prompt, action of this kind by business could produce constructive effects on our economy," he says.

All-Aluminum Home Will Sell for under $7000

An all-aluminum home that will sell for less than $7000 was shown by U. S. Aluminum Siding Corp., Franklin Park, Ill., at the International Trade Fair in Chicago. It has more than 1600 sq ft of living space. First deliveries are expected early next year. The firm will probably give a ten year guarantee.

New Automation Link Unveiled

Weltronic Co., Detroit, has unveiled a new tool for factory control, called "plant-central," which it bills as "the missing link between plant automation and office automation." It's a "building block" system that makes it possible, from one location, to control and dispatch maintenance, truckers, and other workmen; expedite a "hot" job; tell how soon a job will be finished; record

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and plot all conditions for production and payroll; control tools; and answer requests for help. The system will be shown at Detroit's Metal Show, Oct. 23-27, and at Chicago's conference of the American Production & Inventory Control Society, Sept. 28-29.

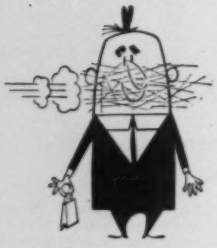
Government Surplus Equipment Sales Set

The Naval Weapons Plant, Washington, will sell $150 million worth of machine tools, measuring instruments, and material handling equipment between Sept. 1, 1961, and July 1, 1962. Martin Co., Baltimore, will sell $126 million worth of aircraft parts, machine tools, electronic testing equipment, portable welders, and other equipment.

RCA Predicts Gains in Medical Telemetry

Tomorrow's hospital patients may have their temperature, pulse, and breathing under constant watch from a central point on each hospital floor, says Radio Corp. of America. The firm has demonstrated a building block system of tiny electronic measuring and radio transmitting devices. Example: A transmitter only slightly larger than a lump of sugar, placed against the patient's skin, detects heart action and transmits the data, without wires, for display as a visible cardiogram.

Straws in the Wind



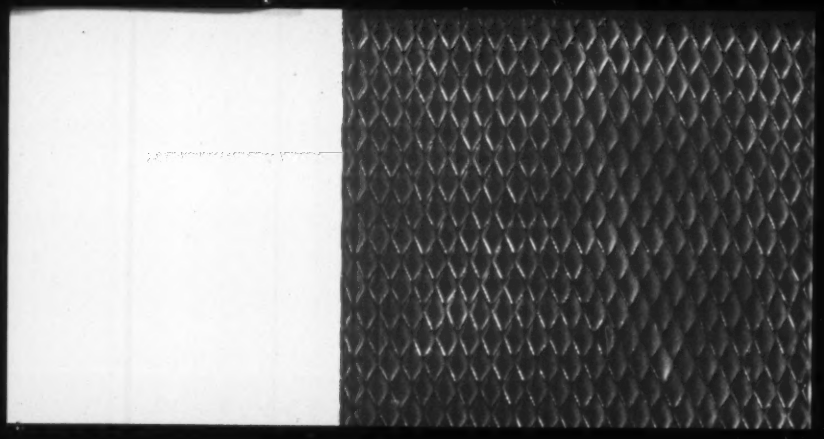
The U. S. Army says a computer program that analyzes the interrelations and order of words in 95 per cent of all sentences is a possibility within the next six months . . . Kaiser Aluminum & Chemical Corp. is boosting output to 90 per cent of capacity by reopening an aluminum potline at its Chalmette, La., plant . . . Moore Associates Inc. predicts $50 million annual sales of electronic, remote control supervisory systems to the petroleum industry and a $20 million annual market in the electric power industry by 1965 . . . Major New England motor carriers have increased rates on small shipments by 11 per cent . . . Bridgeport Brass Div., National Distillers & Chemical Corp., may join Cerro Corp. in a $50 million primary aluminum facility at Wauna, Oreg. Capacity: 56,000 tons a year . . . Westinghouse Electric Corp.'s new pricing policy, reported in STEEL, Aug. 14, p. 19, applies only to motors, not to all items as the STEEL article implied.

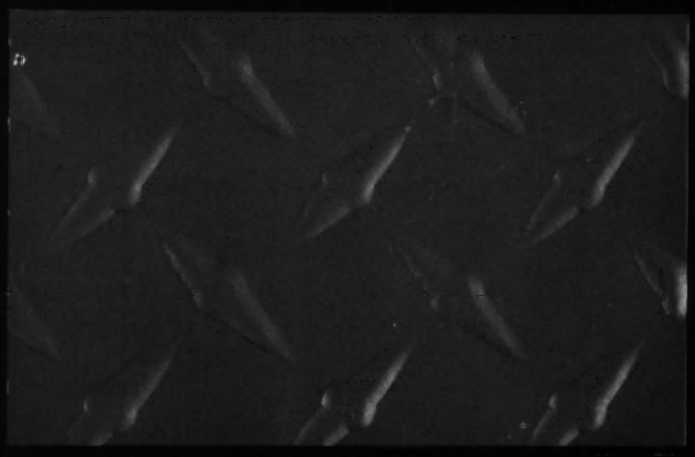
Metalworking Pulse

The Business Trend: An increase in steel production counterbalanced a further decline in auto output and little change was shown in railroad freight carloadings and production of electricity as STEEL's industrial production index held at 159 in the week ended Aug. 12. **Autos:** Output is on the way up after hitting the model changeover trough. **Steel:** A modest increase in business and promise of good volume in September caused the ingot rate to move up slightly.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49=100)
  Week ended Aug. 12 . . . **159†**
  Year ago **147**
  Details on Page 49
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Aug. 19 . . **30,000***
  Year ago **70,808**
  Details on Page 46
- **STEEL INGOT OUTPUT (TONS)**
  Week ended Aug. 19 **1,925,000***
  Week ago **1,910,000**
  Details on Page 91

†Preliminary. *Estimated.

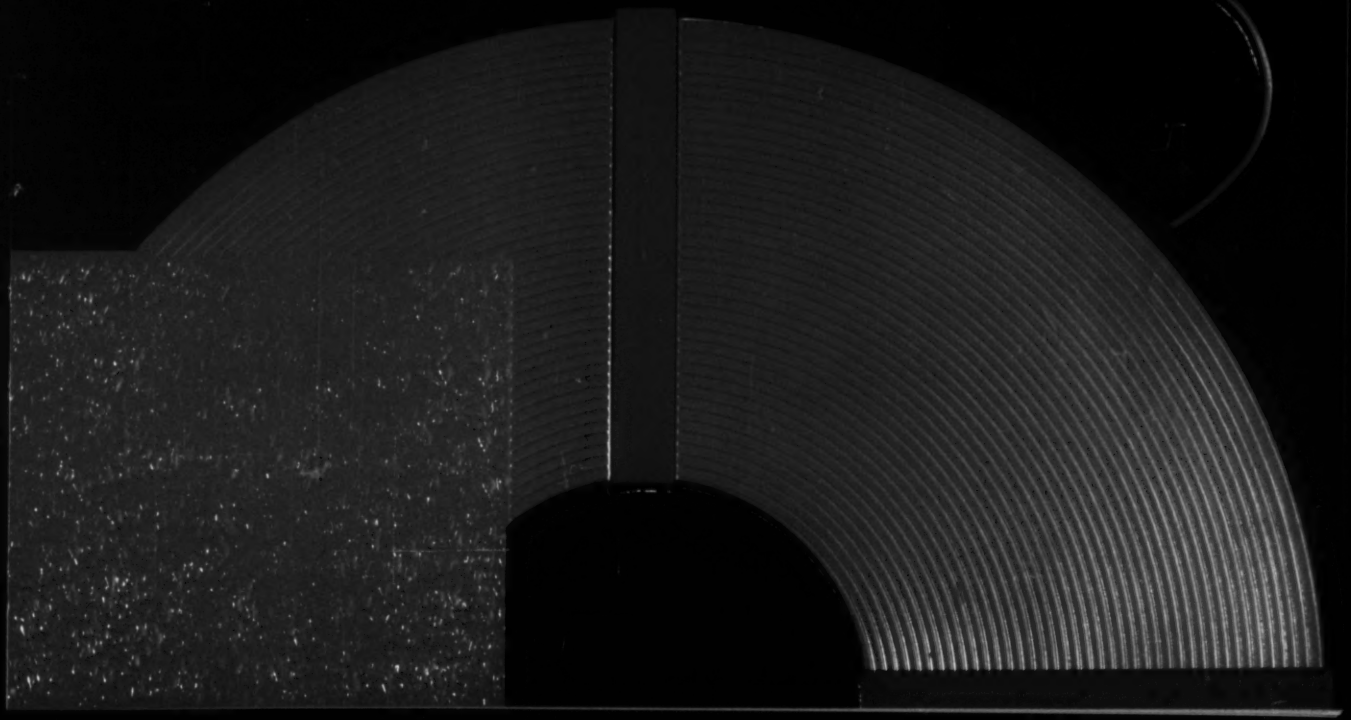


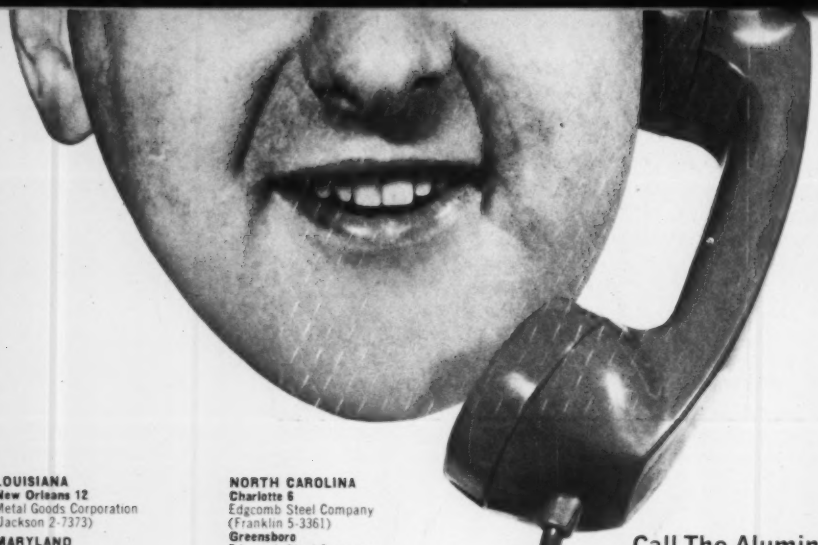


Widest Range from Any Distributor Source. Calling on your local Alcoa distributor for aluminum in all its forms is like having an Alcoa plant next door. Nobody else stocks as much sheet and plate; wire, rod and bar; tube and pipe; and extruded shapes in as many sizes, alloys and finishes. Nobody else can respond as quickly to your call for metal or technical advice.

ALCOA ALUMINUM

DISTRIBUTED NATIONALLY





ALABAMA
Birmingham 5
Hinkle Supply Company, Inc.
(Fairfax 2-4541)
The J. M. Tull Metal & Supply Co., Inc.
(Fairfax 3-1612)
ARIZONA
Phoenix
Ducommun Metals & Supply Co.
(Bridge 5-4471)
Pacific Metals Company, Ltd.
(Alpine 8-7821)
CALIFORNIA
Berkeley 10
Ducommun Metals & Supply Co.
(Thornwall 1-1820)
Los Angeles 59
Benjamin Metals Company
(Rod & Bar) (Nevada 6-0611)
Los Angeles 54
Ducommun Metals & Supply Co.
(Ludlow 8-0161)
Los Angeles 22
Pacific Metals Company, Ltd.
(Raymond 3-5431)
Los Angeles 22
Tubesales (Tube & Pipe)
(Raymond 3-7781)
San Diego
Ducommun Metals & Supply Co.
(Gridley 7-3141)
San Diego 1
Pacific Metals Company, Ltd.
(Belmont 4-3253)
San Francisco 7
Pacific Metals Company, Ltd.
(Underhill 3-5500)
COLORADO
Denver 16
Marsh Steel & Aluminum Co.
(Keystone 4-1241)
Denver 16
Metal Goods Corporation
(Dudley 8-4141)
CONNECTICUT
Milford
Edgcomb Steel of New England, Inc.
(Trinity 4-1631)
Windsor
Whitehead Metals, Inc.
(Murdock 8-4921)
FLORIDA
Jacksonville 5
The J. M. Tull Metal & Supply Co., Inc.
(Evergreen 7-5561)
Miami
The J. M. Tull Metal & Supply Co., Inc.
(Oxford 6-0150)
Tampa 10
The J. M. Tull Metal & Supply Co., Inc.
(3-6741)
GEORGIA
Atlanta 2
The J. M. Tull Metal & Supply Co., Inc.
(Jackson 5-3871)
HAWAII
Honolulu 14
Aluminum Products Hawaii, Ltd.
(94-861)
IDAHO
Boise
Pacific Metal Company (3-6468)
ILLINOIS
Chicago 80
Central Steel and Wire Company
(Republic 7-3000)
Chicago 80
The Corey Steel Company
(Bishop 2-3000)
Chicago 23
Steel Sales Corporation
(Bishop 7-7700)
INDIANA
Indianapolis 18
Steel Sales Co. of Indiana, Inc.
(Liberty 6-1535)
KANSAS
Wichita
Marsh Steel & Aluminum Co.
(Whitehall 2-3231)
KENTUCKY
Louisville 3
Williams and Company, Incorporated
(Juniper 3-7781)

LOUISIANA
New Orleans 12
Metal Goods Corporation
(Jackson 2-7373)
MARYLAND
Baltimore 7
Whitehead Metals, Inc.
(Windsor 4-2000)
MASSACHUSETTS
Cambridge 39
Whitehead Metals, Inc.
(Trowbridge 6-4680)
Roxbury
Eastern Metal Mill Products Company
(Highlands 2-5900)
MICHIGAN
Detroit 12
Central Steel and Wire Company
(Twinbrook 2-3200)
Detroit (Hazel Park)
Meier Brass & Aluminum Co.
(Jordan 6-3902)
Detroit 10
Steel Sales Co. of Michigan
(Tyler 6-3000)
MINNESOTA
Minneapolis 13
Steel Sales Co. of Minnesota
(Sterling 1-4893)
MISSOURI
North Kansas City 16
Marsh Steel & Aluminum Co.
(Grand 1-3505)
North Kansas City 16
Metal Goods Corporation
(Grand 1-3516)
St. Louis 14
Metal Goods Corporation
(Harrison 7-1234)
St. Louis 10
Steel Sales Co. of Missouri, Inc.
(Prospect 1-5255)
NEW HAMPSHIRE
Nashua
Edgcomb Steel of New England, Inc.
(Tuxedo 3-7731)
NEW JERSEY
Elizabeth
Adam Metal Supply of New Jersey
(Flanders 1-2550)
Englewood
Tubesales (Tube & Pipe)
(Lowell 7-4400)
Harrison
Whitehead Metals, Inc.
(Humbolt 5-5900)
Hillside 5
Miller Steel and Aluminum
Division of Robert Campbell Co., Inc.
(Waverly 6-6000)
NEW YORK
Albany 1
Eastern Metals Warehouse, Inc.
(IV 9-3281)
Buffalo 17
Brace-Mueller-Huntley, Inc.
(TR 7-8700)
Buffalo 7
Whitehead Metals, Inc.
(TR 6-3100)
New York (Long Island City 1)
Adam Metal Supply, Inc.
(Stillwell 6-7737)
New York (Brooklyn)
Strahs Aluminum Company, Inc.
(Browning 2-7000)
New York 14
Whitehead Metals, Inc.
(Watkins 4-1500)
Rochester 5
Adam Metal Supply of Rochester
(Locust 2-4260)
Rochester 1
Brace-Mueller-Huntley, Inc.
(Congress 6-6560)
Rochester 10
Whitehead Metals, Inc.
(Butler 8-2141)
Syracuse 1
Brace-Mueller-Huntley, Inc.
(Howard 3-3341)
Syracuse 1
Whitehead Metals, Inc.
(Howard 3-6241)

NORTH CAROLINA
Charlotte 6
Edgcomb Steel Company
(Franklin 5-3361)
Greensboro
Edgcomb Steel Company
(Broadway 5-8421)
OHIO
Cincinnati 14
Central Steel and Wire Company
(Avon 1-2230)
Cincinnati 37
Williams and Company, Incorporated
(Valley 1-5555)
Cleveland 28
A. M. Castle & Co.
(Axminster 2-7600)
Cleveland 14
Williams and Company, Incorporated
(Utah 1-5000)
Columbus 12
Williams and Company, Incorporated
(Axminster 4-1623)
Toledo 12
Williams and Company, Incorporated
(Greenwood 5-8661)
OKLAHOMA
Tulsa 13
Metal Goods Corporation
(Temple 6-2561)
OREGON
Portland 9
Pacific Metal Company
(Capitol 7-0693)
PENNSYLVANIA
Philadelphia 34
Edgcomb Steel Company
(Garfield 3-6300)
Philadelphia 33
Metal Supply Company
(Center 6-0220)
Philadelphia 40
Whitehead Metals, Inc.
(Baldwin 9-2323)
Pittsburgh 33
Williams and Company, Incorporated
(Cedar 1-8600)
York
Edgcomb Steel Company (47-1931)
RHODE ISLAND
Slatersville
Edgcomb Steel of New England, Inc.
(Poplar 7-0900)
SOUTH CAROLINA
Greenville
The J. M. Tull Metal & Supply Co., Inc.
(Cedar 3-8366)
TENNESSEE
Memphis 6
Metal Goods Corporation
(Whitehall 8-3407)
TEXAS
Dallas
McCormick Steel Company
(CH 7-3104)
Dallas 35
Metal Goods Corporation
(Fleetwood 1-3271)
Houston 1
McCormick Steel Company
(OR 2-6671)
Houston 1
Metal Goods Corporation
(Riverside 7-1110)
UTAH
Salt Lake City 1
Pacific Metals Company, Ltd.
(Davis 2-3461)
WASHINGTON
Seattle 8
Ducommun Metals & Supply Co.
(Parkway 5-1500)
Seattle 4
Pacific Metal Company (Main 2-6925)
Spokane 4
Pacific Metal Company
(Keystone 5-3681)
WISCONSIN
Milwaukee 1
Central Steel and Wire Company
(Humboldt 1-5000)
Milwaukee 9
Steel Sales Co. of Wisconsin
(Hilltop 2-2020)

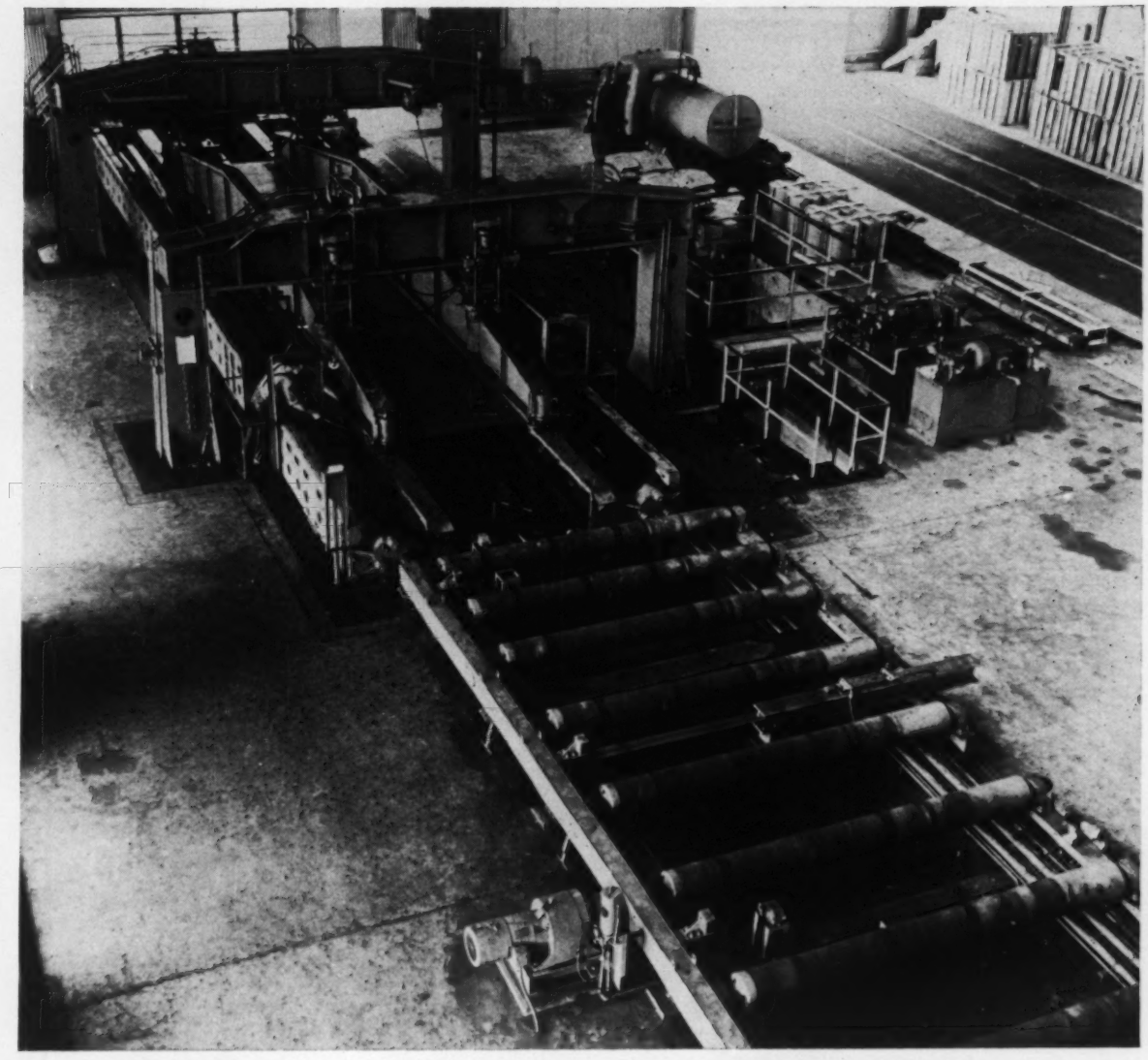
Call The Aluminum Man . . . his stock's the most complete!

Your Alcoa distributor sales representative—*The Aluminum Man*—maintains a warehouse bulging with sheet and plate; tube and pipe; extruded shapes; wire, rod and bar. His stock represents the widest range of aluminum products available from any distributor source. He can arrange for them to be slit, sawed or sheared to your specifications—furnish technical advice you may need on alloy selection and fabrication techniques. He's your fastest supply line for aluminum in any form when you need it. Your nearest Alcoa distributor is listed on this page, so give him a call . . . soon. Aluminum Company of America, 845-V Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

DISTRIBUTED NATIONALLY

Call *The Aluminum Man* . . . he's your Alcoa distributor sales representative



PLANING TIME ALMOST HALVED

New Birdsboro plate planer cuts on back stroke, positions, and ejects on forward stroke

■ Here's how this new Birdsboro planing equipment speeds production of large diameter welded pipe: On the forward stroke it brings a new plate into position and automatically ejects a finished plate. On the back stroke it cuts both sides, then repeats the cycle. The planer's advantages to its user include a virtual halving of planing time . . . allowing production of three miles of 18″ to 42″ O.D. pipe per *day*.

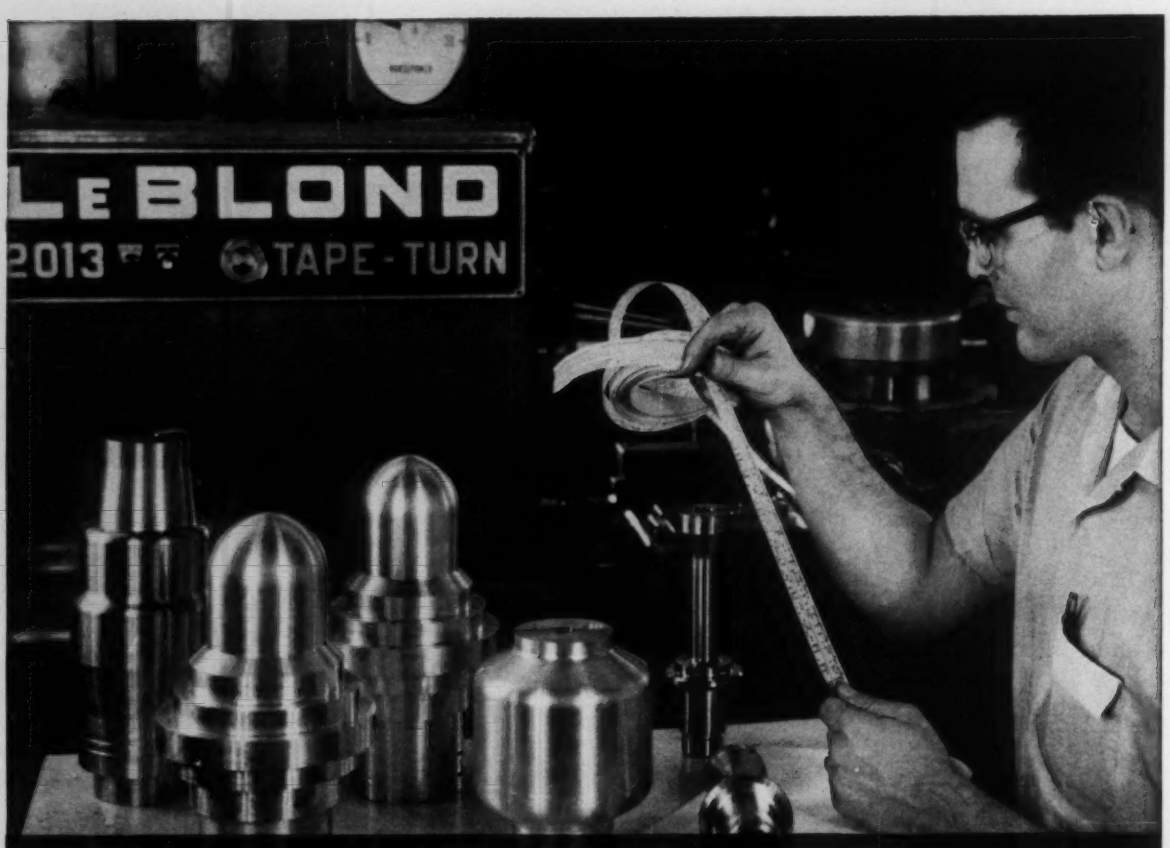
For details on this—and other—unusual mill machinery that delivers significant user benefits, write: *Sales Department, Engineering Department and Mfg. Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.

MM1-61

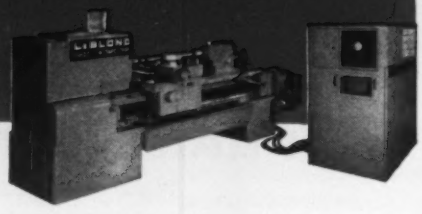
BIRDSBORO

CORPORATION BIRDSBORO, PENNA.

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS • ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL



Turn your parts profitably on LeBlond Tape-Turn



In production now, Eight Heavy-Duty Models:
2013, 2516 and 2516-20 NE, 20 hp. 2516, 3220 and 3220-25 NF, up to 50 hp. 4025 and 4025-32, up to 75 hp.

For turning complex contoured parts, in job lot quantities, Tape-Turn will show you rock-bottom costs! Its continuous path Mark Century tape control puts engineering data at the cutting edge far more efficiently than any manual or tracer turning method.

Because LeBlond pioneered continuous-path turning with tape, you'll benefit by many months of experience. We can show you actual applications on production runs. Our skilled programming staff will help your engineers learn the simple routines involved in tape turning.

Simple programming is a major feature of LeBlond Tape-Turn. The General Electric Mark Century control has a built-in computer which saves the programmer time in setting up for straight cuts, tapers, arcs and blended combinations of these. For the most complex shapes, separate computor assistance is desirable. You can learn the Tape-Turn programming procedure in half a day!

Increased efficiency, reduced lead time, a permanent record in easily stored form, low-cost quality control, reduced parts inventory, shorter set-up time and lower tooling costs—plus all the reliability and precision of a LeBlond Heavy-Duty Lathe—these are yours with LeBlond Tape-Turn. Write for descriptive bulletin TWB.

"*Leading the way in numerically controlled turning*"

LeBLOND of Cincinnati

The R. K. LeBlond Machine Tool Company
Cincinnati 8, Ohio

Fable for Industry

A rabbit and a turtle were having a race. The rabbit, named Boss, was soon far ahead, but was stopped by a steward from the Racetrack Employees Union, Local No. 6.

"You can't go that fast," said the steward. "It violates Section 2B of the contract."

The rabbit argued until he saw that the turtle had crawled ahead. He realized that debate was useless, so he went on at a reduced speed that was still faster than the turtle's pace.

He had passed his opponent once more, when he was again stopped, this time by a representative from the Department of Justice.

"We are charging you with unfair competition," the government man declared. "You are taking unreasonable advantage of the turtle."

"But he agreed to compete," protested the rabbit. He was going to say more but thought it wiser to find his lawyer to draft a reply. That took time. When he finally returned to the track, the turtle was far ahead.

He hurried on as fast as Section 2B would permit and had regained a good lead when his path was blocked by burly pickets from the International Truck Drivers Union. They had been trying to organize a carrot processing plant, one of his major suppliers, and only yesterday had created a disturbance over truck deliveries to him.

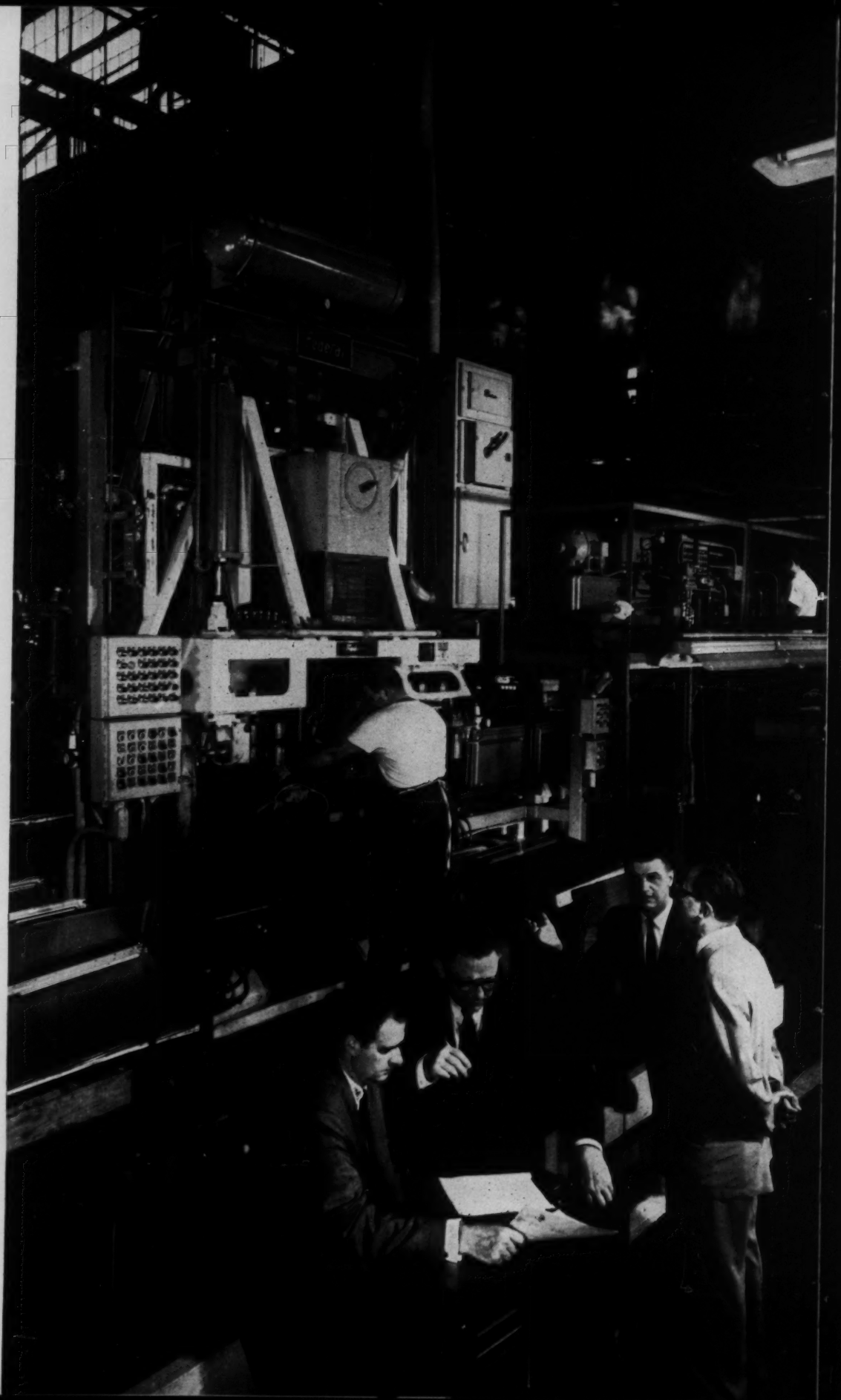
Boss rabbit rushed back to his lawyer, got him to drop everything and go to court on the matter. The judge granted an injunction on the ground that the picketing constituted an illegal secondary boycott.

By the time all that had been cleared up, the turtle was nearly at the finish line. The rabbit made four leaps to pass him. But his victory wasn't declared official until three years later when a grievance filed by Local No. 6 was disallowed and he had won his competition case in a government suit.

Moral: It's tough to be the front runner, but it's still the best position.

John S. Morgan

ASSOCIATE MANAGING EDITOR



Federal Welding Line at Whirlpool's Evansville, Indiana, refrigerator plant automatically forms and welds together complete food liner shells at a rate of 200 per hour. Here, F. A. Bodenheim, Jr., manager of welder sales for McKay's Federal-Warco Division, goes over latest production charts with H. J. Muehlbauer, director of manufacturing engineering for Whirlpool, as Robert Bussell, sales representative for Federal-Warco, discusses operations with Gene Rommel, general superintendent of tooling for Whirlpool.

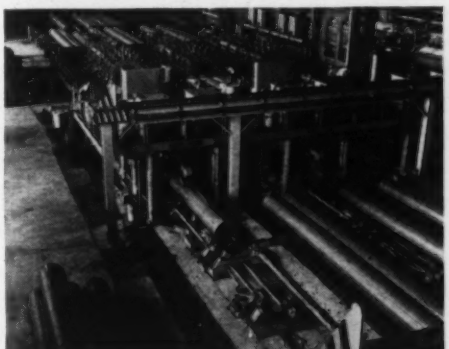
Photo by ARNOLD NEWMAN

A completely integrated plant . . . a single source of supply . . . one area of responsibility! A new idea? Not really, but an idea that's not easy to bring to reality. McKay Machine has done it for metal fabricators, designing and building equipment to volume produce parts or entire units from raw steel to finished product. ***This is McKay Machine*** We know steel handling . . . we've been designing uncoilers and coil-handling equipment for 30 years. McKay Machine knows welding because the highly respected names of Federal, Welder and Berkeley-Davis are now a part of our company. We know processing and forming . . . McKay levelers, tube mills, and cold roll forming machines have been specified by leading industrial firms for more than two decades. And McKay Machine knows stamping, as the Warco Press name testifies. McKay builds the industry's most popular shearing and slitting equipment. Only McKay Machine designs and builds all the components for a truly integrated production line. If you are one of the hundreds of manufacturers who must shave production and handling costs to successfully compete, McKay Machine should interest you. If we do, let us know and we'll meet with you at your convenience. *The McKay Machine Company, Youngstown 1, Ohio.*

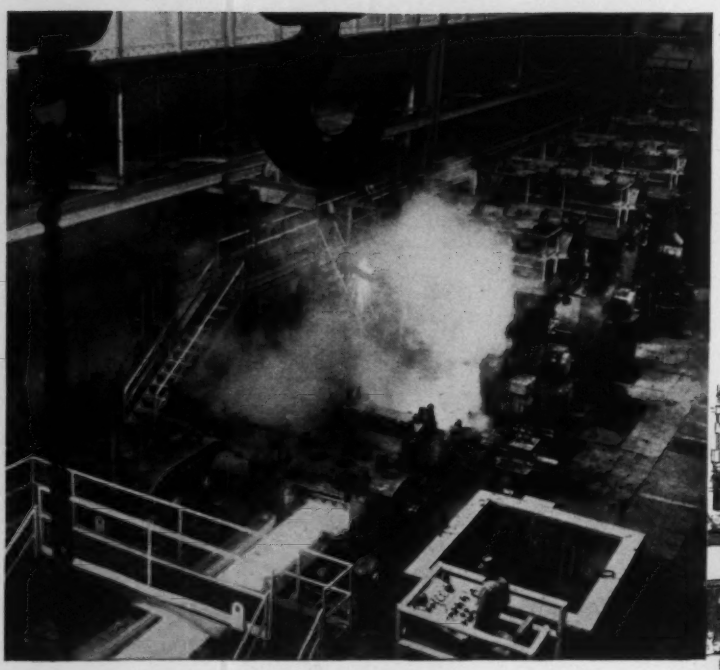
McKAY MEK MACHINE

McKay Tube Mills and roll forming machines are considered among the best engineered in the world.

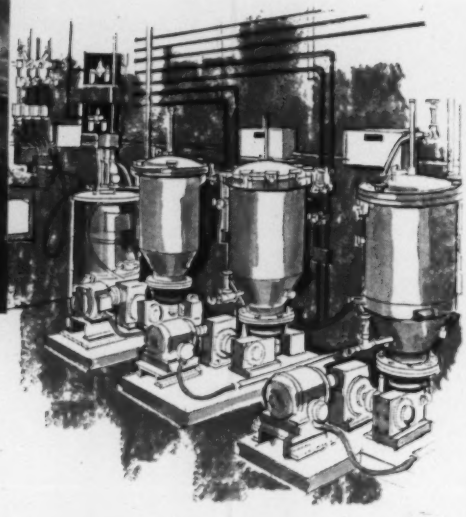
Warco Presses can be found in the leading automotive, appliance and aircraft plants . . . wherever stamping is a major operation.



Berkeley-Davis Fusion Welding Lines, such as the huge installation above, are used by an ever-increasing number of leading steel fabricators.



• Typical large, automatic motor-driven pumping station set-up for heavy-duty service on a hot strip mill centralized lubrication system.



Positive Farval centralized lubrication protects 1597 bearings on Jones & Laughlin's hot strip mill

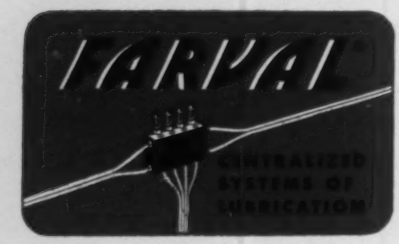
On this semi-automatic, punch card controlled, high-production (*rolls over 100,000 tons monthly*) 44-inch Hot Strip Mill—first of its type in the world—26 Farval centralized lubricating systems work 'round-the-clock to protect 1597 vital bearings—help keep this up-to-the-minute rolling facility in continuous 24-hour production, cut operating costs.

Rolling mill operators the world over have found through experience that Farval:

- Saves time—lubricates all bearings in a few minutes, while mill equipment remains in full operation.
- Saves power—by reducing friction, Farval cuts power consumption by as much as 20%.
- Saves bearings—bearing life increases 5 to 25 times when Farval serves the equipment.
- Saves lubricant—much as 3 out of every 4 pounds.

Farval can be relied upon to provide the right amount of lubrication—when it's needed, where it's needed. In addition Farval provides indication and adjustment at every bearing, system time cycle flexibility, and handles the widest range of lubricants. Many bearings can easily be lubricated over a large area from one conveniently located central station.

Remember, for the ultimate in bearing protection on all types of industrial production machines and equipment—Farval is the cost-cutting answer. Get the latest information on how Farval can fit into your production picture—it's in free Bulletin 26-T. Write us for your personal copy, today.

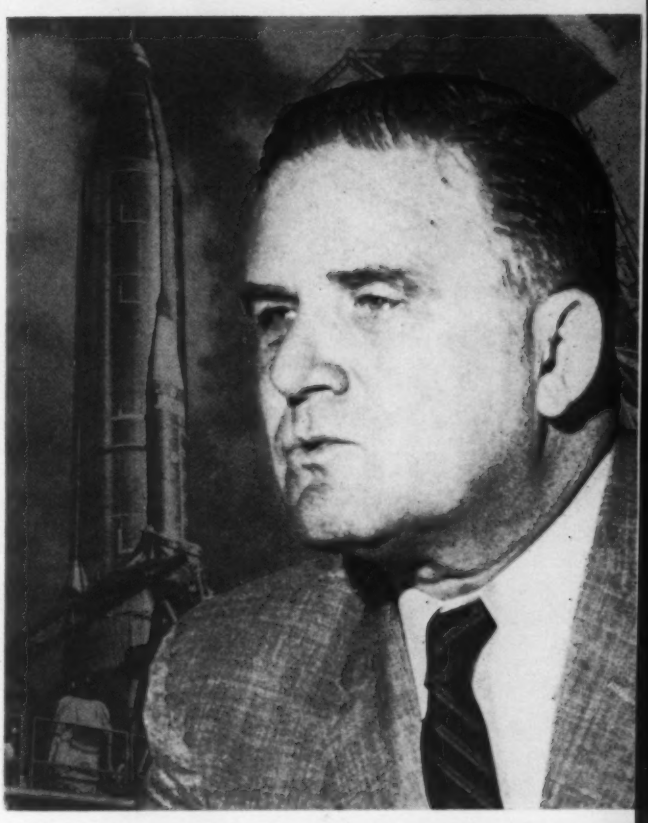


Farval Studies in Centralized Lubrication No. 252

Farval Division • Eaton Manufacturing Company
3278 East 80th Street • Cleveland 4, Ohio

"FOR INDUSTRY, the U. S. space program is not a race to the moon with the USSR. It is progress at forced draft. The lunar landing is the co-ordinating effort of a ten year, $35 billion program to advance science and technology at the most rapid rate in the world . . . each industry or company can find its proper role in the space effort once its management makes the decision to join."

JAMES E. WEBB
Administrator, National Aeronautics & Space Administration.



What Space Program Means to You

BEHIND GLAMOROUS names like Apollo, Saturn, and Nova lie challenging and potentially profitable new frontiers for metalworkers —the multibillion dollar space program of the National Aeronautics & Space Administration.

The race with the Soviets for space supremacy is real. And it's from that race that much of our future technology will come—new metals, alloys, chemicals, as yet unheard of techniques for machining, brazing, welding, forming, and other operations.

Important too, points out James E. Webb, space administrator, will be advanced management techniques—Program Evaluation and Review Technique (PERT) is an example.

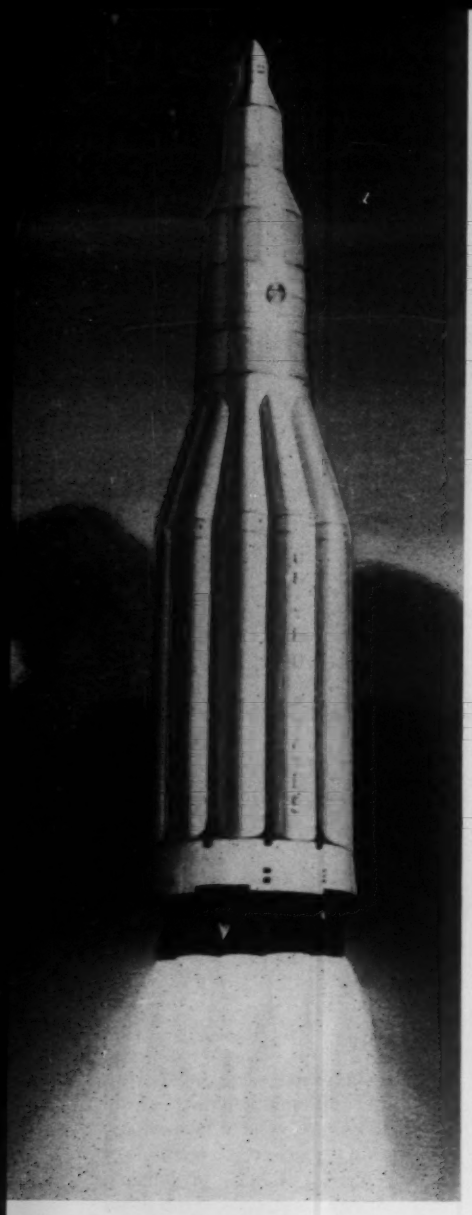
• **Market Dimensions**—The manned moon shot scheduled before the end of the decade will exceed in size and complexity the German V-2 program of World War II, the Manhattan Project to create the atom bomb, the Atlas ICBM, and the Polaris (submarine launched missile) programs. Yet it is only one of NASA's projects. Already scheduled: Saturn vehicle shots to orbit Venus and Project Voyager to put an instrument package on Venus by 1966.

The budget for the national space effort, military and civil, tops $3 billion in fiscal 1962, including $1.7 for NASA, $1.1 for the military, and about $200 million for the Atomic Energy Commission, the Weather Bureau, and other government agencies.

The best way to understand NASA's interests is to scan the list of its major projects in research and development, which account for $1.3 billion of its current budget.

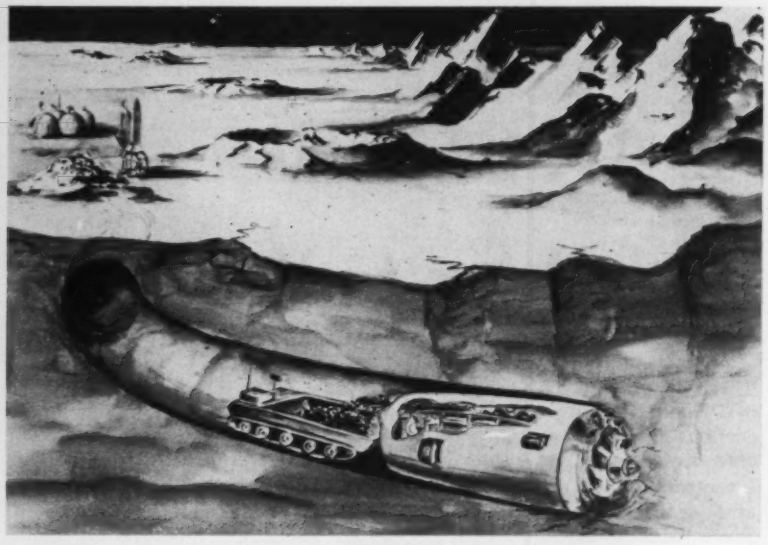
Sounding rockets ($9 million), scientific satellites, ($73 million), lunar and planetary exploration ($160 million), meteorological satellites, ($50 million), communications satellites ($95 million), Mercury, the manned earth orbit project ($74 million), Apollo ($160 million), launch vehicle technology, ($27 million), spacecraft technology ($10 million), liquid propulsion, ($93 million), electric propulsion ($7 million), nuclear systems technology ($36 million), space power technology ($6 million), Scout and Delta, relatively small launch vehicles for scientific studies ($7 million), Centaur, the vehicle for preliminary moon shots ($57 million), Saturn, the vehicle to land equipment on the moon ($224 million), Nova, the vehicle to land a man on the moon ($49 million), and tracking and data acquisition equipment ($39 million).

Examples of advanced research include Langley Research Center's work in magnetoplasmadynamics; Ames Research Center's new, hypervelocity, free flight facility to reproduce flights of vehicles at speeds up to 40,000 ft per second; Lewis Research Center's heat transfer



THE SPACECRAFT TO ORBIT THE MOON (Project Apollo) has been the subject of a feasibility study completed by Martin Co., Baltimore. It is now working on a complete earth-moon transport system study

NASA HAS TWO CHOICES FOR THE MOON TRIP: 1. A huge rocket to take several astronauts there in one nonstop flight. 2. A system of rendezvousing in space outside the earth's gravity pull where several sections of the final moon rocket would be put together. A much smaller rocket would be needed than if the nonstop flight were attempted



ULTIMATELY, A MOON BASE WILL BE REQUIRED—possibly for military reasons, certainly for propaganda purposes. Scientists consider the underground base concept practical because of the extreme temperature changes on the moon's surface—from 250° F to −230° F

studies on exhaust nozzles, Goddard Space Flight Center's planned, stainless steel, space simulator which will be 35 ft in diameter and 52 ft long, and Marshall Space Flight Center's materials work.

• **Host of Problems**—Consider the lunar landing. Bruce T. Lundin, NASA assistant director, cites numerous problems: They involve launching from earth, flight in space, moon landing, moon launch, re-entry into the earth's atmosphere, and, finally, earth landing. Propulsion, structures, and guidance are the basic problems. Liquid hydrogen, with a temperature of −425° F and a density only 1/15 that of water will be the fuel for the upper stages of the launching rocket. Insulation, pressurization, pumping, flow control, and cooling are some of the areas of interest.

Structures will have to meet headwinds of 1000 psi; design must account for buffeting by unsteady air flow. During flight, the effect of zero gravity must be considered on fuel flow (hydrogen literally crawls up the tank walls when gravity is removed). The effect of radiation on solders, plastics, and lubricants in space flight are troublesome; ionization will degrade some fuels. Meteoroid penetration of

the structure must be met with a wall thick enough to make the chance of penetration tolerable, but not so thick (and therefore heavy) as to embarrass the rest of the system.

On the moon, temperatures will range from −230° F to 250° F. The propellent carried for the return voyage is thus in danger of boiling away or freezing. Special coatings must be developed to insulate the fuel tanks.

Landing on the moon brings up the problem of what the surface of the moon is really like. If it's dust or sand, the jets from the rocket will dig a hole into which the vehicle will land. The effect of the dust storm stirred up on radar, television, and optical instrumentation must be calculated.

Re-entry depends on successfully guiding the vehicle into the earth's atmosphere so as to take full advantage of the drag. "Nowhere do the many conflicting requirements of aerodynamics, guidance, structural design, heat protection, materials, and propulsion become more highly interrelated than in the re-entry problem," says Mr. Lundin.

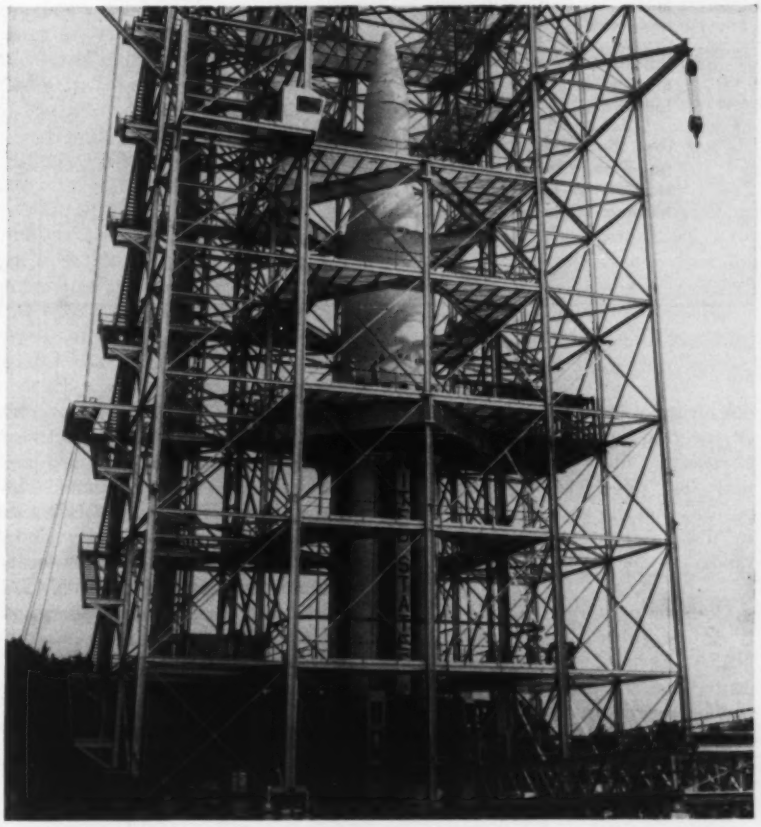
• **Industry's View**—From the viewpoint of NASA and industry, reliability is the key to successful completion of a contract. "We can't afford to let a $10 part wreck a multimillion dollar space- missile," says J. P. McNamara, vice president-liquid propulsion operations, Rocketdyne Div., North American Aviation Inc. He cites these needs: Improved materials (higher strength and lighter weight alloys and better nonmetallics), greater control of quality from source to the finished product, higher precision and improved finishes (control of tolerances and repeatability), new manufacturing techniques, improved processing controls, accurate and detailed documentation of all operations during the manufacturing cycle, and the reduction of human error through better training.

The Aerospace Industries Association warns that the business is "highly competitive" with profits running 5 to 7 per cent before taxes on research and development contracts, while payroll costs continue to increase as more highly paid scientists and engineers are required. Only 57 per cent of the aerospace industry's employment is production personnel.

Chance Vought Corp.'s Gifford Johnson thinks one of industry's biggest needs is for scientifically oriented contracting personnel to "talk the language" of NASA. The agency itself is hiring more procurement people to monitor its contracts with industry and would welcome dealing with industrial contracting officers who know the facts behind their dollar proposals.

• **Opportunity for All**—The commercial communications satellite program getting underway will be handled so that all industry can obtain benefits from it, say NASA officials. That policy will be carried through to other commercial space developments of the future. Radio Corp. of America will build the Relay Active Repeater satellite for the government to prove out (by next July) the theory that a satellite can carry telegraph, voice, and television communications. American Telephone & Telegraph Co.'s commercial communications system will be at its own expense.

• **Cost of Entry** — Space business demands tremendous capital outlays,



Our Biggest Gets Set to Soar

MEN standing on the third level of this 204 ft tower at the George C. Marshall Space Flight Center, Huntsville, Ala., give you an idea of the size of Saturn, heaviest U. S. space vehicle, now undergoing ground tests. Dr. Wernher von Braun, director of the center, says the three stage rocket will be launched late this year from Cape Canaveral, Fla.

Arthur D. Little Inc., Cambridge, Mass., has been awarded a $440,140 contract for a study of the blast effect of the vehicle in the event of failure at launch.

The Kind of Firm NASA Likes to Do Business with

- **One that is interested enough to understand the problems of a new agency in such an advanced field.**
- **One that has a heavy investment in technical skills—so it doesn't need crutches like "fraternity brothers, steak dinners, Congressional pals, or a smooth customer relations man."**
- **One that knows how to bid honestly—wants the job at a fair price without relying on later changes or arguments for more fees.**
- **One that finds a professional challenge in good performance—identifies with the mission rather than finding out how the contracting officer can be outwitted.**

the hiring of expensive scientific and engineering personnel, and the chance that the work your firm does may be sidetracked for another project, but the payoff will put you in the forefront of the new technology.

• **Contracting Organization**—There is no centralized buying office for NASA. Each of six major research centers has the procurement authority and staff to support the projects it sponsors: **Langley Research Center**, Langley Field, Va.; **Ames Research Center**, Moffett Field, Calif.; **Lewis Research Center**, Cleveland; **Goddard Space Flight Center**, Greenbelt, Md.; **Marshall Space Flight Center**, Huntsville, Ala.; and **Jet Propulsion Laboratory** (operated by California Institute of Technology), Pasadena, Calif.

Langley, Ames, and Lewis buy supplies, test equipment, and components and make research contracts. Goddard specializes in satellites, sounding rockets, and tracking. Marshall contracts for launch vehicles and booster engines. Jet Propulsion Laboratory contracts for development and hardware for lunar and deep space probe missions. The Flight Research Center at Edwards Air Force Base, Calif., does work in support of the X-15 airplane. Available is a booklet, *Selling to NASA*, which lists procurement personnel and their interests.

GROWING OPPORTUNITIES IN DEFENSE . . . . NO. 1

This is the first in a series of articles outlining metalworking's growing opportunities in the defense market. The next one, dealing with the Army's program, will appear Sept. 11. The Navy and Air Force will be covered in later issues.

Extra copies of this article will be available until the supply is exhausted. Write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

NASA procurement personnel emphasize the policy of keeping industry informed about what is going on. In July, more than 400 potential contractors were called to Washington for a closed briefing on Apollo, the project to send three men around the moon by 1967. Prime contractors have not yet been chosen, but Massachusetts Institute of Technology will run the guidance component development.

• **Contract Regulations** — The Armed Services Procurement Act is the basic NASA procurement regulation, with two exceptions: 1. Inventions made in the performance of work with NASA generally become the exclusive property of the U. S., unless the administrator chooses to waive the rights. 2. NASA does not indemnify contractors against damages to third persons resulting from hazardous work.

NASA's Dr. Webb emphasized these points for companies wanting to explore opportunities in the space program:

• *In-house work vs. contracting out* —"We keep only enough in-house work to plan, manage, and produce prototypes of our space systems. We believe we should utilize the best resources of the country. Presently, 80 to 85 per cent of NASA funds go to industry or the 60 universities we have contracts with. It's possible that could drop, say to 75 per cent, but the emphasis is on outside work."

• *Small business*—"We have an active program with the Small Business Administration. We hold bidders' conferences and publish lists of bidders in the Commerce Department's *Synopsis*. We intend to make it as easy as possible for potential subcontractors to get NASA business. We will require prime contractors to report periodically on how much subcontracting they are doing with small firms. We intend to keep SBA informed."

• *Patents*—"We have had no case in at least 18 months where a company has been unwilling to accept a contract because of the patent clause. Industry generally feels the patent situation at NASA is fair. We contemplate no changes in the patent clause because it works well."

Local Issues Put Brakes on Auto Talks

Union locals have submitted an avalanche of demands which companies would like to dispose of ahead of the main issues to avoid walkouts later

IT LOOKS like automakers and the UAW face a detour over bumpy local problems before they can get into high gear on major issues. The UAW charges that the companies are refusing to seriously discuss local work standards, health and safety provisions, and seniority problems. It adds that the companies want to limit the number of local agreements and that in several cases they've told plant negotiators not to bargain at all.

The companies are less talkative; but they have indicated that many of the local demands are unreasonable. No doubt about it, they would like to settle such problems soon. Malcolm Denise, Ford's labor relations vice president, earlier pointed out that by curing the most vexing local headaches the companies hope to avoid the rash of walkouts that followed the 1958 agreement. Such panic strikes are costly. One GM local hit the bricks for only 7 hours on Oct. 2, 1958, but it scrambled GM's part supplies, and the company built only 56,000 cars that month instead of the 250,000 it had programed.

Complete unanimity isn't possible on local demands—ranging from efforts to revise work standards to vociferous requests to "patch the parking lot and issue new instead of repaired work gloves and coveralls," but usual practice has been that the locals will quickly adopt a national settlement and iron out petty problems later, so long as the plant management and the local union committee are generally agreed on how the problems will be solved.

• **Demand Load**—GM reports it has been exposed to 12,000 local demands already compared with 9719 in 1958. At that time, the company figured the demands would cost 24 cents per worker per hour. Ford negotiators are whacking away at somewhat fewer issues in 71 of their bargaining units. The company says that 12 other units either have made no requests, or have already reached an agreement. Chrysler's 45 locals are flailing away at work standards, seniority and transfer problems. Talk around labor circles is that Chrysler is apt to run into a rash of walkouts after a national agreement is reached. Outlook for Ford and GM is uncertain.

Life on the local level brings up another area of speculation which can't be ignored. If a strike becomes necessary to the union, how and where will it occur? There's a strong feeling among company sources that the techniques will be to strike a key, captive supplier plant, thus tying up an entire company. It could be done legally after the contract expires, or if the union continues to work without a contract as it did in 1958.

Such a manuever would put plenty of pressure on the company that's shut down because its competitors could keep on producing and selling cars. Ostensibly, at least, the UAW International could claim it had nothing to do with such a strike, thus keeping its skirts reasonably clean if the government steps in.

• **Easy on Strike Fund** — Finally, such a strike would be a cheapie for the union. It would barely have to touch its $42 million strike fund to pay benefits to a few thousand workers in one plant. Employees in many other plants in the company would be entitled to unemployment compensation. Precedent: A decision by the Michigan Supreme Court after the Canton (Ohio) Forge strike of 1953. You'll recall that the 1300 workers in this key Ford plant walked out for 38 days over work standards, health and safety grievances (the only strikable issues on the local level). But most of Ford's auto empire was shut down for lack of parts. Workers in Michigan plants drew unemployment compensation which brought a legal protest from Ford. The argument: Ford saw no reason to even indirectly finance a strike against itself. An appeal upheld the original state court's finding that the workers in these nonstruck plants were blameless and entitled to compensation. The U. S. Supreme Court refused to review the case.

During the Canton case, the UAW indicated it would not use the tactic to pressure national bargaining, but the companies are dubious. "I've never seen that in writing," points out one of the automakers' legal advisers. However, it is true that the UAW has not used the weapon since the Canton strike.

• **Intervention?**—But if the companies and union can't settle, Walter Reuther may use the deadlock as an excuse to bring the government into contract talks. Despite claims that the union doesn't want federal fact finders, the feeling persists that the government would tend to favor the union in any decision it might force.

If that happens, chances are that Ford would be a more likely target than GM. Walkouts at Canton Forge (1300 workers), Indianapolis Steering Gear Div. (2100), or the Cleveland Stamping plant (3000) would tie Ford up in less than a week, say UAW spokesmen. It would take longer to tie up GM, but its critical plants include the Central Foundry plants at Danville, Ill., Ternstedt Div. plants which make trim for all divisions, Delco-Remy Div., Anderson, Ind., AC Spark Plug Div., Flint, Mich., Saginaw (Mich.) Steering Gear Div.

Metalmakers tell House subcommittee about . . .

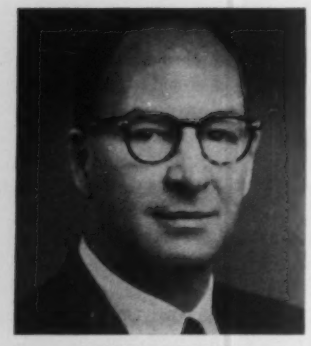
Impact of Imports, Exports on Jobs

R. CONRAD COOPER
Executive Vice President
Personnel Services
U. S. Steel Corp.

Depreciation reform is urgently needed to promote growth . . .

WALTER J. CAMPBELL
Editor
STEEL
STEEL INTERNATIONAL

Industry must become more aggressive in world trade . . .



LEWIS P. FAVORITE
Vice President
Product Sales
Aluminum Co. of America

Tariff concessions needed from foreign countries . . .

THE REALITIES of foreign competition were spotlighted last week as hearings before the House Subcommittee on the Impact of Imports & Exports on American Employment got underway.

First to testify were representatives from the steel industry who pointed out how U. S. steelmakers' share of world output dropped from better than 50 per cent in the 1946-48 period to 26 per cent in 1960.

They were followed by the aluminum industry executives who pointed out that primary production facilities abroad have been built up rapidly. Example of the impact: First quarter exports of the domestic producers were down 57 per cent this year vs. 1960.

The executives were emphatic: We are only on the threshold of world competition. To meet the challenge, they made these suggestions to the subcommittee:

1. Depreciation reform is urgently needed to permit U. S. industry to modernize its facilities as fast as possible.

2. U. S. industry must become a more aggressive world trader, not only to expand the job opportunities here at home but to enhance our position of world leadership.

3. In aluminum, the government should press for tariff concessions from other major aluminum consuming countries—practically all of which have higher tariffs than the U. S.

Here are the highlights of the testimony:

Lewis P. Favorite, vice president-product sales, Aluminum Co. of America, thinks certain foreign trade patterns are emerging which jeopardize the continued growth of the domestic industry: For one thing, recently there has been a rapid buildup of primary aluminum ingot production facilities abroad. The export market for U. S. ingot producers will be "substantially reduced" in 1961, he predicts. In the first quarter, exports were down 57 per cent from the same period in 1960.

The Alcoa executive offered this advice to government trade experts: Get primary aluminum tariffs of all GATT (General Agreement on Tariffs & Trade) members reduced to the U. S. level, which is equivalent to 5.3 per cent ad valorem. Through GATT negotiations, the U. S. tariff has been cut from 3 to 1¼ cents a pound since World War II.

"The time has now come to get some comparable concessions from other major aluminum consuming countries, practically all of which have higher tariffs than the U. S.," said Mr. Favorite. France's ad valorem rate on primary unalloyed ingot is 16 per cent; Italy's rate is 20½ per cent; West Germany's rate is 7½ per cent. Other import restrictions are also made on U. S. products.

• **Aluminum Interests** — "Aluminum imports are causing the nation to lose significant employment, personal income, corporate earnings, and tax revenues," said Ward C. Humphreys, vice president, Kaiser Bauxite Co. and Washington office manager of Kaiser Aluminum & Chemical Corp.

• **Supply and Demand**—"The Free World supply of aluminum exceeds consumption," said Irving Lipkowitz, director of economic affairs, Reynolds Metals Co., Richmond, Va. He commented that the domestic industry is capable of producing all the aluminum and aluminum products required to meet U. S. demands and fill export orders as well. Result: To the extent that imports enter, they cause unemployment in the U. S.

"We in U. S. Steel strongly believe in a free and growing international trade from which no industrial nation can turn aside except at its own economic and political peril," said R. Conrad Cooper, executive vice president-personnel services, U. S. Steel Corp., Pittsburgh.

Mr. Cooper told the subcommittee that jobs in the steel industry have been lost or not provided as a result of trends that affect our nation's steel imports and exports. Among the reasons for the trends: The persistence of our competitive hourly employment cost disadvantage and the narrowing of our competitive advantage in productive efficiency.

• **Point by Point**—"Domestic steel companies have more world competitors than ever before," he said. "Since 1950, steel ingot production in the rest of the world has been increasing rapidly . . . as a result, (by 1960) the U. S. share of world steel ingot production has declined from 46 per cent to 26 per cent."

He pointed out that the tonnage of steel exports from the U. S. dropped from 15 per cent of world steel trade in 1950 to 7 per cent in 1960. At the same time, steel imports into the U. S. rose from 1.5 per cent of domestic supply to almost 5 per cent.

"All the evidence indicates that foreign competition in steel will intensify," observed Mr. Cooper. Prominent factors: Fast growing foreign markets; since 1959, the U. S. has been a net importer of steel; extensive rolling mill construction in Europe; a high rate of expansion in ingot production capabilities; substantial growth in the tonnage of finished steel imported in end products.

• **Labor Advantage**—"Hourly employment costs in the U. S. steel industry are from three to nearly seven times total hourly employment costs in countries of the European Coal & Steel Community, the United Kingdom, and Japan," Mr. Cooper said. "Each 1 per cent increase in steelworker employment cost in this country would have to be matched by 7 per cent in Japan simply to prevent our competitive disadvantage from worsening."

Regarding productive efficiency, Mr. Cooper said our historic superiority in this area is being steadily reduced as foreign steel producers match the best of our efficient, high output facilities.

• **Response to Challenges** — "One of our most important competitive tools is research," said Mr. Cooper. U. S. Steel has 1700 people engaged in this activity. Another tack: In an upward trend, investments in new and improved steel facilities in this country, have amounted to almost $14 billion since 1946.

Mr. Cooper also noted that other industrial nations in the Free World have more realistic depreciation laws than those in the U. S. He urged revision of our depreciation tax code to promote economic growth and modernization.

• **Tool Steel Jobs**—Imports of tool steel and products made from it cost the U. S. an estimated 2000 jobs last year in an industry considered among the most strategic by defense agencies. So spoke H. S. Potter, vice president-sales, Carpenter Steel Co., Reading, Pa., who appeared as chairman of the U. S. Tool & Fine Steel Industry Committee, an informal group of 14 U. S. tool steel manufacturers.

Stressing the rising level of imports, Mr. Potter pointed out: Tool and high speed steel imports in 1958 amounted to 2900 tons, about 4 per cent of domestic tool steel production. In contrast, imports in 1960 increased to around 12,000 tons, close to 12 per cent of U. S. production.

• **Labor Impact**—Those 12,000 tons could have meant more than 1000 jobs for U. S. workers or longer workweeks for those employed in the industry. Indirect imports (tool steels going into imported end products) about equal the tonnages of direct imports, meaning another 1000 jobs lost.

• **Price Spur**—"The reason for the imports is simply price," he said. They are sold on a delivered basis at prices sharply lower than those in the U. S.—some as much as 55 per cent below current prices. U. S. producers cannot meet those prices without operating at a loss.

"There are two ways to look at the explosive growth of Western Europe and Japan," stressed Walter J. Campbell, editor of STEEL. "We can view it as a greater threat to our national security and economic well-being than the space or missile gaps—intensification of import competition could bomb out U. S. businesses and jobs.

"But the second view—the one I favor—is that the vast industrial development coming in the world provides us with a magnificent opportunity. If we can become more aggressive traders in world markets, we can provide more jobs, become more prosperous, and enhance our position of world leadership."

Our participation will not be automatic, warned Editor Campbell. He cited three major steps that must be taken:

1. "Industry must become a more aggressive world trader. We will have to learn more about world markets, how to design products for them, how to sell them.

2. "We will have to offset the effect of higher labor costs industry pays through massive investment in modern machinery and equipment to lower our unit costs to competitive levels.

3. "If we are to become a more important exporting nation, industry will need the support of government. We will need more skilled assistance in diplomatic and consular posts, more data on world markets, assistance in long term credit to meet foreign competition."

Look for Senators Douglas, Kefauver, Gore, Carroll and others to join in . . .

Keeping the Heat on Steel Prices

LOOK FOR some senators to take the floor and warn the steel industry that it will set off a new inflationary spiral if it boosts prices this year.

The groundwork was established at a recent dinner meeting called by Sen. Albert Gore (D., Tenn.). About 20 of our more liberal senators showed. The speaker, Harvard economist Otto Eckstein, related steel prices to the economy and to price indexes in particular.

The professor is an old hand at the subject: In 1959, he and Gary Fromm of Harvard contributed two papers to the Joint Economic Committee of Congress on "Steel and the Postwar Inflation."

Professor Eckstein told STEEL: "I haven't changed my mind since writing the papers."

What Mr. Eckstein said in 1959: "Any price increase in steel ripples through the economy in the form of cost increases, leading to higher prices in other industries . . . the extraordinary behavior of steel prices from 1947 to 1958 accounted for 40 per cent of the rise of the wholesale price index."

Listening with rapt attention to the presentation were Senators Gore, Paul H. Douglas (D., Ill.), John A. Carroll (D., Colo.), Joseph S. Clark (D., Pa.), Eugene J. McCarthy (D., Minn.), and representatives from Sen. Estes Kefauver's (D., Tenn.) office.

Senator Kefauver last week maintained his claim to first rights in the field by saying he would investigate steel if prices were raised this fall. But his fellow senator from Tennessee, Albert Gore, will put in his own claim, with his opening remarks on the floor of the Senate. Sources close to Senator Gore sum up his position this way: "There are a number of indicators which point strongly to a price hike; the senator is concerned that the pressure of the increase, along with the pressure of defense spending, will substantially increase the threat of inflation."

Observers wise to the methods of Capitol Hill predict that a series of speeches on the Senate floor will have the desired effect on the steel industry, despite legitimate claims being made for a boost in light of upcoming wage increases.

Senator Gore is, for the moment, taking the spotlight off Senator Kefauver's steel price act, but wise heads suggest that Mr. Kefauver won't stay quiet long, whether prices go up or not.

The steel industry might take heart from the fact that every Senate Democrat was invited to the dinner, but only 20 chose to participate or send representatives. One source says all who attended were "interested" in the professor's 20 minute talk; it will even be more interesting to see who climbs on the Gore-Kefauver bandwagon after it gets rolling. In checking speech writers and advisers of several senators, STEEL found little enthusiasm for the job.

● **SCOTT HITS PLANT PIRATING**—Sen. Hugh Scott (R., Pa.) has attacked the new area redevelopment agency which administers distressed area legislation. Industry is being encouraged to leave such distressed states as Pennsylvania, West Virginia, and Kentucky. The agency's first project went to Arkansas—a shirt factory owned by a northern corporation.

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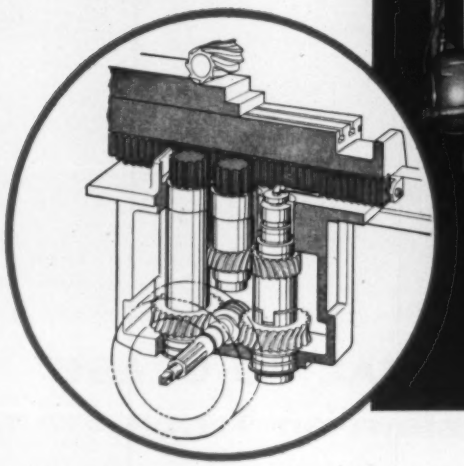

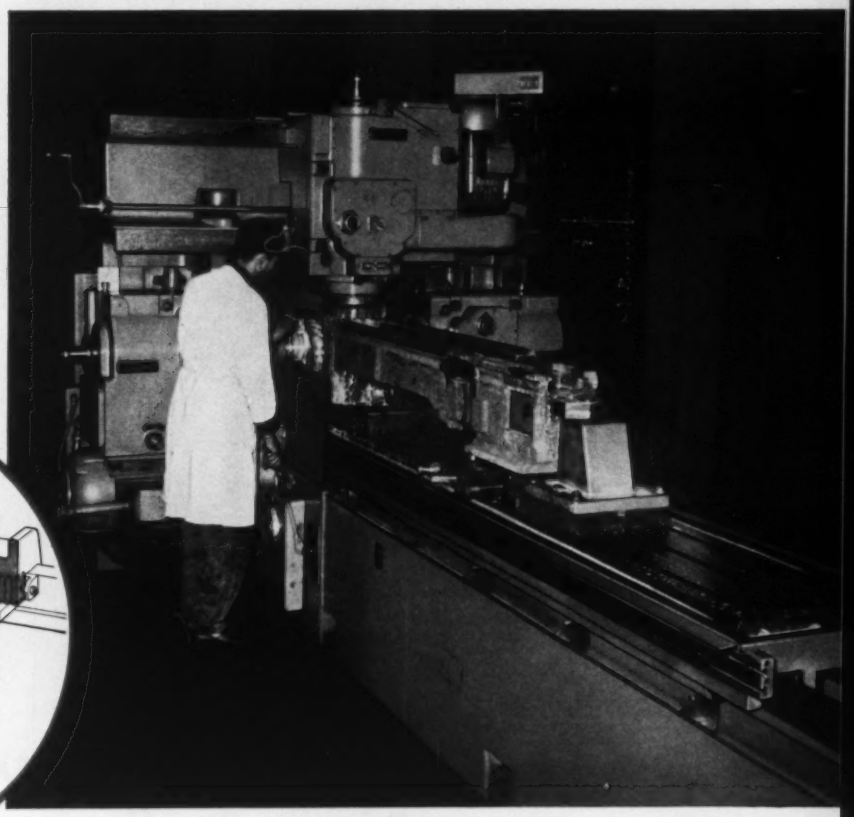

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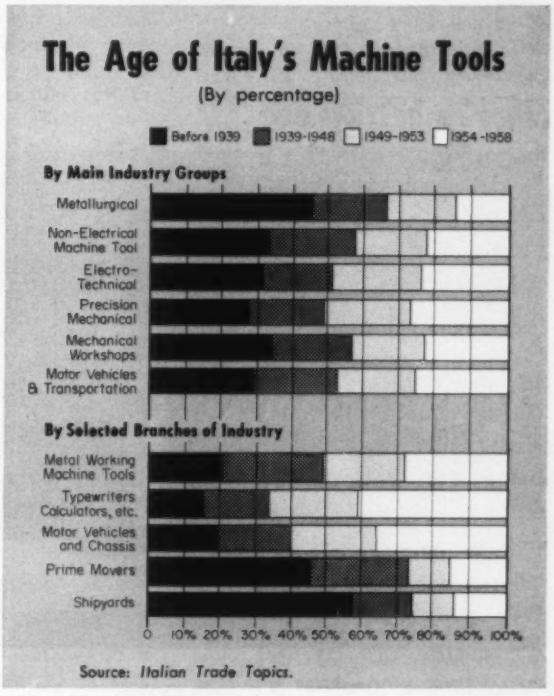
Italy Tackles Problem of Machine Tool Obsolescence

ITALY'S need to modernize its production facilities has not only spurred its domestic machine tool industry, but has created a good market for foreign producers as well.

Italian machine tool builders produced $75 million worth of equipment last year. That's 35 per cent more than in 1959 and about double 1955's total. Imports in 1960 totaled about $39.2 million vs. $18.9 million a year earlier.

It's important to note, however, that most of the imports were limited to high value, special purpose machines. The Italians exported $34.4 million worth of general purpose tools last year.

The U. S. ranked second to West Germany last year in supplying the Italian equipment market.



Puerto Rico Attracts 17 U. S. Firms

SEVENTEEN U. S. metalworking firms were among 190 U. S. and Puerto Rican firms that signed up for new, Operation Bootstrap factories in the commonwealth during fiscal 1960-61, the Puerto Rico Economic Development Administration reports. Among metalworking ventures: Dodge Inc., Kelvinator International, Products Engineering Corp., Mayflower Packaging Co., Becton Dickinson Co., Sta-Brite Mfg. Co., Aluminum Anodizing Corp. of America, and Ideal Mfg. Co. Products they'll produce include rebars, refrigerators, fire alarms, diecastings, wire specialties, and trophy bases.

Latin American Aid Doubles

U. S. AID to Latin America during the next decade will amount to at least $3.5 billion, say economists at Chase Manhattan Bank, New York. That would be nearly double the amount of aid extended in the last ten years.

Present commitments to Latin America include: $500 million under the Act of Bogota, $100 million for Chillean earthquake relief, and $525 million to the Inter-American Development Bank. Assuming those commitments will cover five years, they represent an annual average exceeding $200 million. Adding Export-Import Bank of Washington loans comparable with those of the last ten years would boost the average to $350 million.

West Africa Needs U. S. Trade

THE NEWLY independent countries of West Africa need and want to develop commercial relations with the U. S., reports a U. S. trade mission. Secretary of Commerce Luther H. Hodges says the report "makes it clear that now is the time to get in on the ground floor while these countries are in the early stages of their economic development and need our help."

The trade mission visited Ivory Coast, Dahomey, Togo, Niger, Upper Volta, Senegal, Mali, and Mauretania. STEEL talked with Dr. Albert C. Stewart, assistant research director, Union Carbide Consumer Products Co., a division of Union Carbide Corp., New York. He says the construction and industrial machinery market appears to be in for a rapid expansion as the young nations begin building roads, bridges, dams, ports, railroads, and irrigation systems. Immediate markets exist for consumer goods, such as simple tools, household goods, and medical supplies.

U. S. Shares in Growing Industry

THE WEST GERMAN business machine industry, including the overseas operations of several U. S. firms, is growing fast. Ranking second to the U. S., Germany's 1960 production had a value of $176 million, an increase of $10 million over 1959's. Pushing the United Kingdom out of second place in the list of major importers of business machines, German imports jumped from $42.4 million to $61.7 million last year.

U. S. firms shipped 32.1 per cent of that country's imports—$18.6 million worth. Punch card machines accounted for one-fourth of the imports, calculating and bookkeeping machines accounted for another quarter.

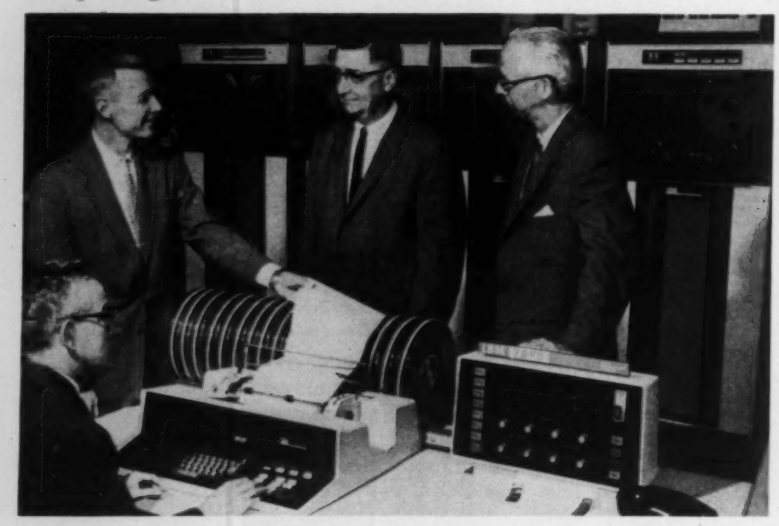
German business machine exports have ranked second in the world for several years. Last year, they increased by $21.7 million to $105.3 million.

Service Centers Turn to Computers

They're getting one .

ANALYZING A COMPUTER TEST RUN on inventory are (l. to r.) Norm Jones, vice president, West Coast operations; Harry Falkenberg, controller-secretary; and Clint Clark, assistant controller for A. M. Castle & Co., Chicago. The program was tested at a data processing center on a 1401; Castle has the hardware on order

They've got two . . .



CHECKING THE RUNNING LOG coming off Joseph T. Ryerson & Son Inc.'s 7070 console typewriter are Harlan S. White, manager, data processing (seated); and (l. to r.) Russell M. Braga, controller; Merle A. Miller, vice president, finance; and Vernon D. Rogers, director, office administration

SERVICE CENTERS are bucking a tough profit squeeze. With the industry's profit average ebbing to 1.6 per cent of sales last year, two Chicago companies are trying computers to combat the trend.

A. M. Castle & Co. is graduating from a punched card tab installation to an IBM 1401 tape system. Joseph T. Ryerson & Son Inc. is programing a 1401 and 7070 complex.

Both firms will benefit from faster handling and processing of mountains of paperwork. The electronic brains will foster speedier decision making. Each company has plants across the country and sees advantages in centralized general accounting, inventory management, and market analysis.

Castle's Plans

A. M. Castle's computer is scheduled for delivery around July of next year. "We've been thinking about computer applications for three to four years—intensively for the last year—and found most of them a bit too expensive for our operations," observes Robert J. Heggie, president. "We finally chose the 1401 because it will do the job, at the best cost, and offers possible solutions to problems of medium sized companies like ours. It should enable us to set real and attainable goals.

"Inventory and marketing are the two biggest payout areas. We will be able to gear inventory closely to forecasted demand. It will even help in special studies. If a major stainless steel customer expects more business, we could build a selective inventory, at the right time and in the right place, to fit his needs."

• **Inventory Critical** — With few manufacturing companies building stocks of finished steel, yet demanding and getting immediate delivery from suppliers, the computer assumes significant stature in service center operations. Mr. Heggie points out: "We will record metal

sizes, shapes, and kinds, leadtimes, and order quantity on the machine instead of using our present manual inventory system. We could simulate our inventory position, say for six months in advance, and adjust our position quickly when new market factors come into play. All of this can be done more rapidly, in greater volume, and with more flexibility than ever before." Clint Clark, Castle's assistant controller, adds: "Centralizing inventory control should help us expedite shipments too."

The company has seven districts consisting of eleven plants. When the 1401 becomes operational, all accounting, purchasing, and invoicing will funnel through Chicago. Objectives: Benefit buying and selling decisions, optimize costs, select best order quantities, analyze transportation, and figure charges for extras.

When the company's Cleveland plant, for example, gets an unusually large order it can't fill, a query will be sent to Chicago. Other stocks, itemized in the computer, will be checked. After a rapid but full analysis of alternatives, the Cleveland plant may be authorized to buy the material direct from a mill or supplier, or a transfer of stock from another plant may result.

• **Marketing Potential**—One possible forecast is explained by Mr. Clark: "We might determine a market's potential by defining and programing the product, prospective customers, tons of steel used by Standard Industrial Classification groups broken down by goods Castle can expect to sell, and weighted by the potential customer's employment. In another run, we might translate industry trends into the number of tons we can expect to sell as our share of the market."

• **Faster Reporting** — Another advantage is cited by Harry Falkenberg, secretary - controller: "We want to get sales statistics and expense reports back into the hands of our operating people more promptly. These men have responsibility for control, but they're in the dark about their operations for almost a month after our books are closed at the end of the month. We now cycle reports within three weeks and we anticipate getting them out in one week. How? We will update records each day with the 1401 instead of taking on a mass accounting job at the close of the month."

There are roadblocks on the way to smooth performance. Mr. Clark mentions this one: "Our people, for example, have difficulty deciding what they want the computer to do. They don't know its potential. Right now, we're conducting meetings with our staff and department heads to present and explain the possibilities and we're beginning to get indications of enthusiasm in various departments.

"One stumbling block can be removed by cross-fertilization. We have to familiarize accounting people with the mass mechanization afforded by computers and we have to acquaint our tab people with accounting practices. Our accountants are accustomed to making intermediate checks on their figures, subtotaling page by page, for example. With the computer, assuming figures and the system are accurate when introduced into the machine, intermediate checks will be unnecessary. On the other side, we have to expand the knowledge of the tab people — they should have a little more knowhow than a bookkeeper and slightly less than a junior accountant."

• **Training Must** — "Our employment will probably increase because of the added capacity and output of the computer," comments Mr. Heggie. "We're certainly not looking forward to savings in manpower as major factors and there won't be a reduction in force."

The company has sent one man to 1401 school for programers and Sept. 1 is the target date for beefing up the programer staff. Mr. Clark says: "We did some aptitude testing and discovered people from outside the tab department will make programers—some of them are in clerical areas. We will send those selected to 1401 school and do quite a bit of training on the job.

"Five programers will work on the initial installation. After the system goes operational, we will appoint one person as supervisor and chief programer and assign two others to work with him. Three others will be trained and placed in reserve in accounting."

• **The Payoff**—Says Mr. Heggie: "I would hope that in the accounting area, savings would offset the cost of computer organization and operation at the end of six months. We do a lot of hand posting of data cards, and the computer should relieve that load. After 12 months for accumulating inventory and marketing information, we should

How Computers Can Aid Warehouses

Inventory Control— Consolidate reports for all company warehouses.

Market Analysis— Pin down market potentials by customers, products, areas.

General Accounting— Process mountains of paperwork at blinding speeds.

Reports— Cut report cycle times by two thirds.

Operations Research— Simulate conditions for study instead of tying up capital and operations with trial and error approaches.

Over-all Benefits— Can lower costs, add flexibility, capacity, and efficiency, and speed decision making by rapid fact gathering.

reach the payoff stage."

Ryerson's Operations

The whirs and clicks of electronic business machines have been familiar sounds in the offices of Joseph T. Ryerson & Son Inc. for 25 years. The company moved from a 604 tab unit to a 650 computer, and now has the faster, more versatile 1401 and 7070 combination.

"We spent five to six years studying an integrated system, detailing costs, and determining present and future uses," says Merle A. Miller, vice president, finance. "We were seeking more efficiency and less cost in paper processing," he comments. "Our 650 equipment provided a steppingstone for reaching this ultrahigh speed complex. Formerly, we didn't have enough capacity for analysis in marketing, sales, and inventory management. This new installation offers greater efficiency, the same degree of accuracy, is faster, and we can change, adapt, or add to the equipment because it features modular components."

• **Major Potential**—Ryerson has 20 plants in its nationwide network and record keeping is a tremendous task. In inventory management alone, the company reviews about 60,000 stock items a month. That fact, coupled with the fact that Ryerson, in 1960, paid out roughly 75 per cent of its sales dollars to mills and suppliers, indicates that centralized inventory management could pay off.

"Basically," says Vernon D. Rogers, director, office administration, "a plant manager must know what's in stock, where the items are, what and when to buy, and how much by items. We think the computer system will help us with our buying and do it successfully. We will feed the computers data on leadtimes, stock turnover, general economic conditions, best quantities for mill deliveries, and similar facts, to facilitate buying."

Mr. Miller emphasizes: "We couldn't do that job manually. If we tried that approach at the plant level, for example, each manager would have to interpret his own operations and situation. Trying to figure an optimum inventory position based on his own and company issued information would result in wide latitude in reports. We think the computers will give us more uniformity and certainly better control through centralization."

• **Programs** — The company has charted 39 major programs for the system and in terms of data volume, they are 85 per cent operational. Close attention to detail and objectives smoothed the way for the main switchover within 60 days after the new equipment arrived at Ryerson in mid-March. Around mid-September, the changes should be completed.

Most of the jobs to be performed by the computers are already mechanized to some degree. Payroll, accounts payable, accounts receivable, sales analysis, sales costing, and the customer mailing list are among the principal ones. A big task is the transfer of accounting data from millions of punched cards to magnetic tapes. Ten million punched cards (occupying one hundred fifty 22 drawer filing cases) will be condensed onto about 88 reels of tape.

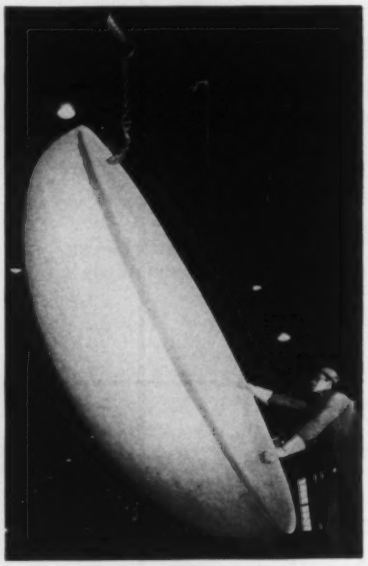
The computer is now pricing and billing for the Chicago plant, the company's largest. In market research, the computer is being used to compile statistical summaries of products, customers, and areas.

"We might take on operations research studies to evaluate scrap savings, simulate buying, and customer order scheduling, but those are in the future," comments Mr. Miller. "Some valuable byproducts came out of our study of computer operations. We found new techniques that would improve existing operations and we adopted them immediately without waiting for the computer to become operational."

• **Blinding Speed**—The 1401 is 25 times faster, the 7070 a hundred times faster than the outmoded 650. The new equipment will calculate Ryerson's entire payroll in 2½ minutes vs. the 4 hours it took on the 650. Another indicator: In just 1½ seconds, the 7070 adds 21,600 sets of 10 digit numbers. When typed, the list would stretch the length of a football field.

Though the output is lightning-like, the input can pile up. Mr. Miller says: "The communications industry is making progress in the development of means to communicate economically between far flung plants and computer centers. We need something like a wire transceiver to convert our data into tapes." It now takes 32 hours for a teletype to print out (at 75 words per minute) all the accounting information gathered by the company's East Coast plants in one 24 hour period.

• **Advice for Shoppers**—"Be pretty conservative in your initial considerations," advises Mr. Miller. "No one should even consider this type of hardware unless they have immense volumes of paperwork, do engineering and feasibility studies, or are in the process industries where computers can control production and quality. At the end of one year, we expect to be operating our new system at less cost than we did with the 650."



Steel Plate in Space Race

A 10 FT CAP for a 1.5 million lb space thrust was rolled and spun from ⅝ in. thick ultrahigh strength steel by Lukens Steel Co., Coatesville, Pa. It performs at 90 per cent of its own yield strength (vs. about 50 per cent for ordinary steels). The 3200 lb dome is part of an order for solid fuel, rocket booster engines.

Stainless Strip

Vertical Bright Annealing Furnace added to EF Research Laboratory

This vertical furnace, newly installed in our research laboratory, will bright anneal 1500 lbs. per hour of 24″ wide strip at temperatures up to 2100°F. The strip is heated electrically in a hydrogen, dissociated ammonia or other protective atmosphere; is jet cooled prior to discharge; and does not come in contact with rolls in either the heating or initial cooling zones.

This furnace has already made successful production size experimental runs on various analyses of stainless steel trim stock for five large primary steel producers, and is expected to be used for research work on all grades of stainless, also carbon steel and non-ferrous strip.

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'62 Sales Target: 6.5 Million Cars

Automakers are optimistic again this fall. Several factors support their optimism, but Detroit knows that it faces a tough battle for the consumer's hard goods dollar

TODAY MARKS the start of several weeks of public forecasts about 1962 auto sales by car company executives. They'll make their projections at the advance previews of new models. Display of the cars in dealer showrooms will start next month.

The forecasts are bullish as usual, but even the company economists (whose predictions often are "upgraded" by the time they're publicized) are convinced that 1962 is shaping up to at least a 6.5 million unit sales year. Peak forecasts will call for 7 million deliveries. That includes imports which Detroit feels will continue close to the 400,000 unit level. (Several nonautomotive analysts think imports may rise to half a million next year.)

The figures for 1962 compare with anticipated sales of 5.8 million to 5.9 million cars for calendar 1961, although Lee Iacocca, general manager, Ford Div., Ford Motor Co., still believes the industry can top 6 million if the present sales pace continues. July sales totaled 420,000.

1962 Production Forecasts

Estimates on output range from 6 million to 6.8 million cars, say analysts and economists STEEL has queried. The only public prediction made so far has been turned in by Harlow H. Curtice, former General Motors Corp. president and still a GM board member. He confidently asserts that 1962 production will hit 7 million. Anticipated output for this year is 5.6 million, says *Ward's Automotive Reports.*

Why Detroit's Optimistic

You'll recall that last fall's predictions called for the same high sales total (GM predicted that 7 million cars would be sold), but they had to be revised sharply downward by the first of the year. What makes the automakers so willing to set their sights so high again?

The obvious reasons that you'll hear are that the economy is recovering at a slow but steady pace from early 1961 levels. Now it will get a big lift from the hike in defense spending. That is revenue that's most quickly translated into consumer income, say the marketers. Result: Gross national product is expected to be up to a $540 billion rate in 1962, $20 billion above the anticipated average rate for 1961.

Unemployment will start dropping in the last quarter of this year. It should be easier to get credit this fall and during the first quarter of 1962. At the end of June, installment credit stood at $42.4 billion and the payback rate was near an all-time high.

The number of cars bought on credit over the last five years has held at a consistent 65 to 67 per cent of all cars purchased, says the University of Michigan's Survey Research Center. That provides a built-in market of people ready to buy again after making the last payment on their old cars. In the preceding five years credit buyers accounted for 59 to 62 per cent of total purchasers. That slight percentage variation can make a difference of half a million sales.

More Money to Spend

Personal savings and disposable income both show increases in the second quarter over the first. That's a sign that people have more money to spend on cars and other goods. Savings reached a $25.7 billion rate in the second quarter compared with $23.7 billion in the first three months. In 1955 (record year), savings ran at a $17.5 billion rate. Personal disposable income now stands at annual rate of $361.7 billion, a $7.4 billion hike over the first quarter rate.

And the used car market is the strongest it has been since January. The average auction price is $1062, a full $100 higher than a year ago when 1961 models were introduced. A fast moving, used car market

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Auto Performance Report

(Millions of units)

	Sales	Production	Imports
1961*	5.8	5.6	0.40
1960	6.5	6.7	0.44
1959	6.0	5.6	0.67
1958	4.6	4.2	0.43
1957	5.9	6.1	0.26

*Anticipated. Source: Automobile Manufacturers Association.

helps new car sales because dealers can allow more on trade-ins.

Other plus factors include family formations (a 2 per cent growth rate is expected next year) and some 3 million war babies born 18 years ago who should be invading the market place in 1962. Don't forget that because of last year's recession, many of 1955's 7.2 million car buyers have hung onto those cars. (Normally, about a third of each year's buyers keep their cars five years or more.) Automakers call this "pentup demand."

The University of Michigan's surveys indicate that would-be buyers who held off during the recession are beginning to regain confidence. With money to spend and the prospect of steady employment, look for as many as half a million holdover purchasers to come into the market place.

Labor strife could shake consumers' confidence. It still seems unlikely, but if there should be a prolonged auto strike it would keep buyers out of the 1962 car market. Steel labor contracts are up for renegotiation next year. Here too a labor stalemate could freeze out buyers.

History Should Repeat Itself

Historically, auto sales always have shown a sharp increase ranging from 26 to 40 per cent in the year following a recession, figures compiled by Ford Motor Co.'s market research offices show. For example, car sales climbed 29 per cent in the year following the 1957-58 dip. They went up 30 per cent after the 1948-49 slump. And autos have always recovered faster than the rest of the durable goods markets which showed sales increases of 15 and 22 per cent for those same postrecession years. Even a conservative 20 per cent hike over 1961 deliveries would bring next year's sales up to 6.9 million.

A factor that's harder to pin down is the feeling on the part of some automotive analysts that many of the leisure goods markets have become temporarily saturated. That could make more consumer dollars available for car buying.

Producers of leisure goods naturally don't agree. Evinrude Motors Div., Milwaukee, Outboard Marine Corp., retorts that the outboard motor market is only about 8 per cent saturated. The entire pleasure boating industry reaped $2.5 billion in sales last year, double what it took in in 1955. The U. S. Department of Commerce says that "activity in the industry should increase slightly in 1961 over 1960."

Swimming pool sales will hit a peak of $850 million this year, but the National Swimming Pool Institute has not projected sales for 1962. Regardless of which side you're on, this contention for the consumer dollar will be a factor in next year's auto sales.

Will Car Prices Go Up?

Perhaps the biggest unanswered question from buyers is: Will there be a price hike on the 1962s? Prices haven't been finalized, but carbuilders have made it clear all year that they hope to hold the line. They are faced, however, with the prospect of a boost in labor costs and with higher steel prices.

Look for only minor revisions in the list prices of new models, although many of the accessory packages will be taken off the standard list and made extra cost options. Those can always be switched back later if sales need a stimulant.

As the new model season gets underway, it's evident that Detroit is planning a big buildup during the first half. Traditionally, the industry builds 55 per cent of its calendar year output in the first six months, but at least one bank analyst thinks that in 1962 the factories will produce up to 57 per cent of the 1962 output in the first half, only 43 per cent during the July-December period.

If you want a conservative figure on which to base your 1962 planning, look for production of 6.2 million cars and sales of 6.5 million, including imports.

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	599,474	613,136
July	399,157	434,377
7 Mo. Totals	3,135,874	4,243,871
August	.....	305,514
September	.....	407,691
October	.....	617,972
November	.....	597,638
December	.....	523,422
Total	.....	6,696,108

Week Ended	1961	1960
July 15	127,157	105,113
July 22	102,875	112,179
July 29	74,831	107,019
Aug. 5	32,464	103,504
Aug. 12	21,202†	84,139
Aug. 19	30,000*	70,808

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

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$600 Billion GNP by 2nd Qtr, 1963

HOW DOES THAT estimate of gross national product fit into your thinking? It sounds big, but it isn't out of the ball park.

But not too many businessmen are prepared to go that far into the future or that high on the economic scale yet. There are too many "ifs" to consider. Aside from the everyday uncertainties of doing business, there are more major developments pending today to cloud the economic horizon than at any time since the Korean War.

• **Auto Strike**—Of most immediate concern to many is the possibility of an automotive strike. If there is none, the experts look for sales of close to 6.5 million units in 1962. (See Mirrors of Motordom, Page 45.) But if there is a strike of major proportions, the production timetable will be thrown off schedule, and, undoubtedly, some sales will be postponed and never regained. Another alternative is a rush on 1961 model inventories and used cars during the temporary shortage, which would decrease next year's sales and production.

• **Cold War**—One of the major considerations is the impact of President Kennedy's spending program for the cold war—how much will be spent, when, and what happens when current programs expire. It has been estimated that as much as 75 per cent of the additional $3.5 billion voted this month by Congress could be spent before July 1, 1962. If it is, an appreciable boost will be given the economy in the first half of 1962. But many wonder what will happen when that money runs out.

The Berlin crisis has also created some doubt about many of the Kennedy domestic programs, which have been counted on to lend strength to the uptrend next year.

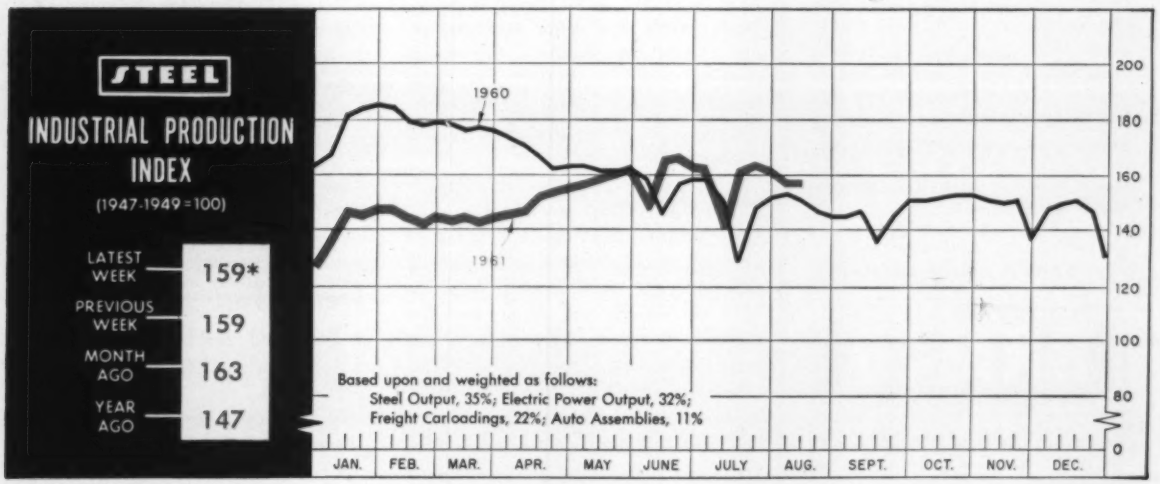
• **Steel Prices**—The moment of decision is approaching on whether to build steel stocks in anticipation of possible price hikes in October. If customers rush into the market in any significant number, it could lead to correction later on.

Of more serious concern is the effect a general steel price rise would have on other prices—autos, appliances, machinery, and components. Steel users assert they cannot absorb increases in costs, yet it might be dangerous to pass them on and run the risk of pricing their products out of the market. The effects on profits could be serious.

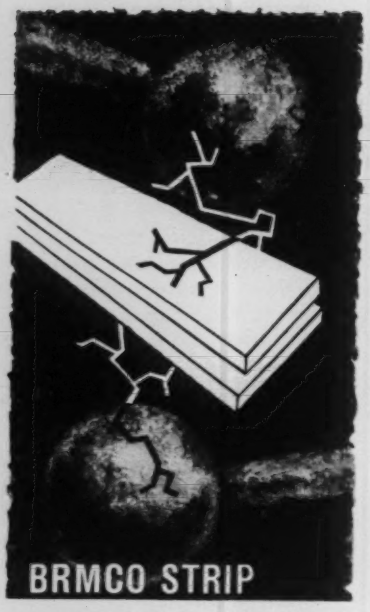
• **Steel Strike**—Even before the last round of steel wage hikes goes into effect, there is considerable discussion about what will happen next June 30, when the present contract with the United Steelworkers expires. There is likely to be some buildup of inventories in the first half in anticipation of either a strike, more price increases, or both. This would simply borrow production from the second half and possibly lead to an inventory correction similar to the one which has just been completed.

• **Inflation** — All the foregoing — strikes, wage increases, price hikes, war scare—could easily lead to another round of inflation. It is academic whether booms lead to inflation, or vice versa. But in the postwar period, the two have usually run together, and the inevitable result has been a bust.

• **Depreciation — Taxes** — Many businessmen are stymied on the outlook for 1962 because they don't know what kind of depreciation reform they will get, if any. If Congress gets around to passing a business-accepted bill early enough in 1962, it could result in an appreciable increase in spending for new



*Week ended Aug. 12.



CUSTOMER REPORTS

246 ORDERS RECEIVED / 000 ORDERS REJECTED

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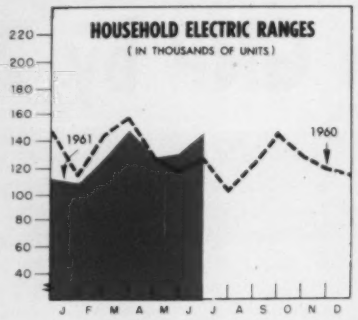
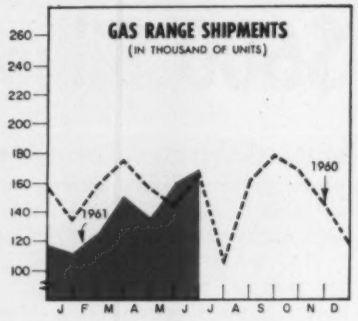
THE BUSINESS TREND





	Total Factory Sales—Units 1961	1960	1959
Jan.	109,400	116,000	120,800
Feb.	128,100	144,500	134,600
Mar.	148,200	157,700	172,600
Apr.	128,400	127,900	136,100
May	131,600	118,500	133,400
June	145,000	127,200	151,400
July	.....	102,900	129,200
Aug.	.....	123,400	116,600
Sept.	.....	144,000	157,200
Oct.	.....	129,100	143,400
Nov.	.....	119,400	144,000
Dec.	.....	114,400	147,500
Totals	.....	1,525,000	1,686,800

National Electrical Mfrs. Assn.
Charts copyright, 1961, STEEL.

	Shipments—Units 1961	1960	1959
Jan.	114,800	133,400	148,700
Feb.	124,800	159,300	152,400
Mar.	150,800	174,800	171,300
Apr.	136,000	156,500	165,800
May	161,500	145,500	160,400
June	169,200*	166,500	171,000
July	.....	105,700	143,800
Aug.	.....	162,800	176,400
Sept.	.....	178,600	210,500
Oct.	.....	169,000	195,000
Nov.	.....	144,400	159,900
Dec.	.....	117,900	157,100
Totals	.....	1,814,300	2,012,300

*Preliminary.
Gas Appliance Mfrs. Assn.

plant and equipment which could give an aging upcycle an additional boost. If Congress reneges, businessmen might renege too on planned expenditures.

Also, any relaxation in the tax rules—either corporate or personal—could lead to additional spending and intensify or extend the uptrend.

• **Profits**—In addition to increased costs, strikes, and taxes, at least two other developments—foreign competition and price fighting—could have a serious effect on profits next year. More and more businessmen are complaining about the profit squeeze and its impact on their spending plans. Any serious worsening of the situation could dampen the outlook.

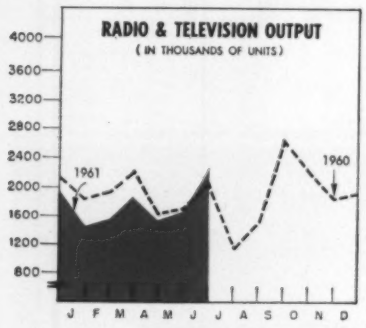
• **Unemployment** — Despite the near record number of employed persons, unemployment still reached 6.9 per cent of the work force in July (seasonally adjusted), and the outlook is for no less than 5 per cent in the foreseeable future. Many observers feel that this will put a psychological block on the spending plans of many consumers, even though the economy may be on its way to records over-all. Without the full-fledged support of the consumer, it is problematical as to how high the economy can go.

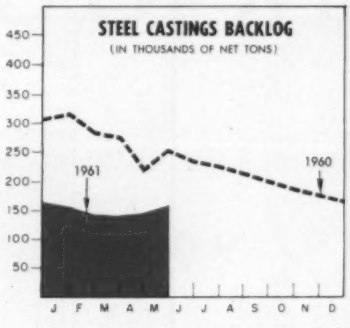
Nevertheless, it is well recognized by almost everyone now that the economy is in a bona fide recovery which will extend well into 1962. It is highly unlikely that all the above factors will come into play at once, either for or against the general trend. What is more likely is that the upcycle will run its course according to the pattern of its postwar predecessors (an average of about 27 months) before another mild recession sets in. But the clouds of uncertainty are going to make it more difficult for even the economists to pinpoint either the duration or the magnitude.

Until a better figure comes along, a peak of $600 billion (annual rate) for gross national product in the second quarter of 1963 seems to be within reason.

Trends Fore and Aft

• Increased steel output counterbalanced a further cutback in auto production, and electricity output and railroad freight carloadings showed little change in the week ended Aug. 12 as STEEL's industrial production index held at the





	Radio		Television	
	1961	1960	1961	1960
Jan.	1,090	1,356	368	526
Feb.	1,115	1,442	444	503
Mar.	1,384	1,668	497	550
Apr.	1,125	1,230	406	423
May	1,197	1,277	470	442
June	1,626	1,551	615	519
July	....	890	...	269
Aug.	....	1,048	...	462
Sept.	....	1,945	...	679
Oct.	....	1,728	...	500
Nov.	....	1,469	...	430
Dec.	....	1,522	...	405
Totals	....	17,126	...	5,708

Electronic Industries Association.

	Shipments		Unfilled Orders*	
	1961	1960	1961	1960
Jan.	96.2	122.6	156.7	314.2
Feb.	92.6	129.3	145.0	279.7
Mar.	107.3	143.7	143.6	278.0
Apr.	94.0	127.2	147.2	218.9
May	103.2	126.6	157.4	252.3
June	....	137.0	....	233.8
July	....	89.6	....	223.9
Aug.	....	101.7	....	213.6
Sept.	....	104.3	....	199.4
Oct.	....	102.7	....	186.3
Nov.	....	99.6	....	174.3
Dec.	....	108.2	....	162.9
Total	....	1,392.5		

*For sale. U. S. Bureau of the Census.

previous week's reading of 159 (1947-49=100).

• Fifty-eight per cent of the reporting members of the Purchasing Agents Association of Chicago said they expect business this year to be better than it was in 1960. Only 16 per cent said it would be worse.

• Shipments this month will be better than July's, said 109 out of 174 reporting members of the Gray Iron Founders' Society Inc.

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,925[1]	1,910	1,558
Electric Power Distributed (million kw-hr)	16,100[1]	16,137	14,622
Bituminous Coal Output (1000 tons)	7,935[1]	8,135	7,834
Crude Oil Production (daily avg—1000 bbl)	7,050[1]	7,024	6,834
Construction Volume (*ENR*—millions)	$557.3	$458.1	$435.5
Auto, Truck Output—U. S., Canada (*Ward's*)	28,389[1]	45,412	96,827
TRADE			
Freight Carloadings (1000 cars)	600[1]	589	600
Intercity Truck Tonnage (changes from year ago)	+3%	−0.2%	−1.3%
Business Failures (Dun & Bradstreet)	406	319	269
Currency in Circulation (millions)[2]	$32,564	$32,449	$32,129
Dept. Store Sales (changes from year ago)[2]	+3%	+2%	−2%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$26,670	$25,871	$23,827
Federal Gross Debt (billions)	$292.0	$292.4	$288.2
Bond Volume, NYSE (millions)	$30.6	$33.0	$24.7
Stocks Sales, NYSE (thousands of shares)	18,163	18,833	14,700
Loans & Investments (billions, adjusted)[3]	$115.0	$115.0	$105.1
U. S. Govt. Obligations Held (billions)[3]	$33.8	$34.1	$27.1
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	225.8	225.1	230.6
All Commodities[6]	118.9	118.7	119.4
Commodities Other than Farm & Foods[6]	127.6	127.7	128.3

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

HOW TO SAVE MONEY BY RIVETING

I **Design** for rivets. Use their adaptability not only for assembly, but for electrical contacts, pivots, inserts in molded materials, fastening a number of parts in one operation, joining metallic and nonmetallic parts together, or to each other.

II Plan on **high speed assembly.** Riveting is a high speed operation, and even manually operated machines include automatic hoppers. The uniform quality and strength of Milford semi-tubular, tubular, split or compression rivets permits the use of high speed production equipment by unskilled operators.

III Count on a **positive** joint. A riveted joint can be visually inspected, an advantage not to be overlooked when compared to many other methods of fastening.

IV **Use** Milford's "five plant" facilities. Each Milford plant is strategically located to serve the important industrial areas of the U.S. **Order** and **get** Milford Products **when** and **where** you need them.

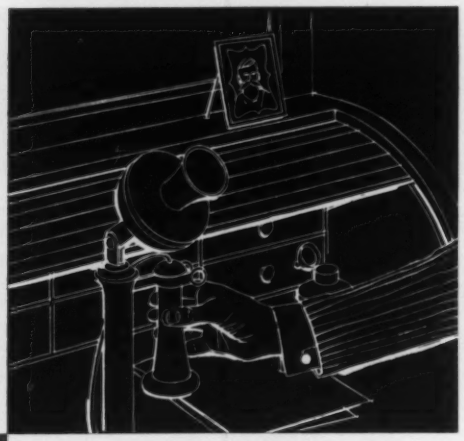
Have **uninterrupted production** with Milford rivet-setting machines. Used singly, or in economical "multiples", where you set more than one rivet with no increase in labor or handling costs, Milford riveters, setting Milford rivets, are the surest way to lowest in-place assembly cost.

THE MILFORD RIVET & MACHINE CO.

MILFORD, CONNECTICUT • HATBORO, PENNA.
ELYRIA, OHIO • AURORA, ILL. • NORWALK, CALIF.

SANDVIK QUALITY

Is Earning Its *Second* Generation of Satisfied Customers

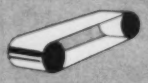


In over 40 years of tough competition, SANDVIK quality has earned, held and expanded SANDVIK'S place in American industry.

To keep old customers and to make new ones over the years, Sandvik *had to deliver superior performance, consistently*. Nothing else explains Sandvik's growth.

5 SANDVIK QUALITY PRODUCT LINES

SPECIALTY COLD ROLLED SPRING STEELS
STAINLESS WIRE AND TUBING



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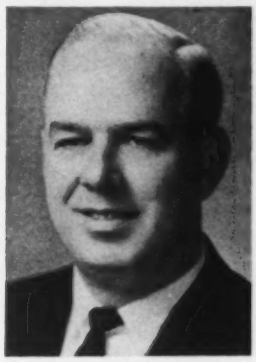
ALFRED F. BAUER
Doehler-Jarvis Div. mgr.

WILLIAM E. GEIDT
Inland Steel appointment

CURRY E. FORD
National Carbon dev. dir.



JOHN H. DeVRIES
Michigan Plating president

Alfred F. Bauer has been appointed manager of the **Doehler-Jarvis Div.**, National Lead Co., New York. He has been assistant general manager.

International Resistance Co., Philadelphia, promoted **J. Burton Henry** from marketing director for IRC resistor products to the new position of director of sales for all products.

Weirton Steel Co., Weirton, W. Va., named **John T. Mayhew** manager of the sheet mill, **Benjamin W. Jones** assistant manager, and **A. John Macdonald** superintendent, a new position.

Daniel E. Murphy has been promoted to assistant to the president of **Consolidated Electrodynamics Corp.**, Pasadena, Calif., a subsidiary of Bell & Howell Co.

Keystone Steel & Wire Co., Peoria, Ill., promoted **Jerry G. Weiss** to the new position of director, wire mill development. He has been assistant superintendent, wire mill.

William E. Geidt was made manager of marketing at **Inland Steel Container Co.**, Chicago, division of Inland Steel Co.

Curry E. Ford has been named director of development for **National Carbon Co.**, New York, division of Union Carbide Corp. He has been director of marketing.

Kenneth W. Gordon has been appointed manager of product engineering at the Burlington, Iowa, plant of **J. I. Case Co.**

Alex W. Warner has been elected vice president and general manager of **Dytronics Inc.**, Rochester, Mich.

Wesson Corp., Ferndale, Mich., made **Robert W. Berry Jr.**, chief engineer. He was chief research development engineer.

Robert K. Nelson was made technical director of **Eaton Axles Ltd.**, Warrington, England. He formerly was assistant chief engineer of the axle division of Eaton Mfg. Co.

John H. DeVries was named president of **Michigan Plating & Stamping Co.**, Houston. He was executive vice president.

Francis J. Dunleavy was made general manager, Communications & Controls Div., **Radio Corporation of America**, New York. He has been general manager, industrial controls.

Indiana Forge & Machine Co., East Chicago, Ind., elected **E. J. Carlson Jr.**, president. He was vice president of sales.

Robert J. Racine has been made national sales manager of **Kelite Corp.**, Berkeley Heights, N. J. He was western regional sales manager.

Hayward F. York was appointed manager of manufacturing engineering for **Chrysler Corp.**, Detroit. He has been chief production engineer.

Thermal Dynamics Corp., Lebanon, N. H., elected **James A. Browning** president. He has been

JERRY G. WEISS
Keystone Steel promotion

ROBERT W. BERRY JR.
Wesson chief engineer

ROBERT K. NELSON
Eaton Axle tech. dir.

JAMES A. BROWNING
Thermal Dynamics president

JAMES B. FISHER
Superior Steel sales mgr.

FRANK HACH JR.
Harris chief ind. eng.

ROBERT B. NEWMAN
Vulcan Containers v. p.

JAMES KYFFIN
Norgren v. p.-mfg.

director of research and development.

James B. Fisher has been made general manager of sales for **Superior Steel Div.**, Carnegie, Pa., of Copperweld Steel Co. Formerly Detroit district sales manager, he replaces **William M. Cowles** who is retiring.

George Friend has been appointed quality control manager of the Wire & Cable Div. of **Electric Autolite Co.**, Toledo, Ohio.

Charles M. Brown succeeds **Matthew Goodall Jr.**, retired, as superintendent of the foundry at **Dodge Mfg. Corp.**, Mishawaka, Ind. He was assistant superintendent.

David M. Andrews has been promoted to superintendent of the Babbitt Road (Cleveland) plant of Chase Brass & Copper Co. Inc.

Henry W. North has been appointed manager of the new Chemical Machinery Div., **Birdsboro Corp.**, Birdsboro, Pa.

Harris Calorific Co., Cleveland, appointed **Frank Hach Jr.**, chief industrial engineer. He was methods engineer, Lincoln Electric Co.

Robert B. Newman has been named vice president-director of sales at **Vulcan Containers Inc.**, Bellwood, Ill. He continues as sales manager.

Mansfield D. Sprague has been elected president and chief executive officer of **AMF Overseas Corp.**, subsidiary of American Machine & Foundry Co., in Geneva, Switzerland. He continues as a vice president and director of AMF.

Sunbeam Equipment Corp., Meadville, Pa., appointed **John P. Zur** vice president of engineering; **Willard Roth**, engineering manager; and **Norman J. Acker**, assistant engineering manager.

Carpenter Steel Co., Reading, Pa., promoted **W. Kent Kise Jr.** from assistant manager to manager of electronic alloy sales.

James Kyffin was made vice president of manufacturing of **C. A. Norgren Co.**, Englewood, Colo. He has been director of purchasing and traffic. **Robert F. Dee** was named sales manager.

Stanley B. Kurzina Jr. has been named works manager of the **Borg & Beck Div.**, Chicago, of Borg-Warner Corp. He was vice president-manufacturing with Curtiss-Wright Corp.

Robert L. Hurley joined **National Beryllia Corp.**, Haskell, N. J., as vice president-marketing. He was vice president-sales at Advanced Vacuum Products Inc.

Electro-Tec Corp., South Hackensack, N. J., has appointed **Noel S. Siegel** manager of the new Relay Sales Group; **James DePalma** manager of the new Slip Ring Product Sales Group; and **John D. Sheeran** manager of customer services.

Russell B. Miller was appointed general sales manager of **Chicago**

HENRY W. NORTH
new Birdsboro div. mgr.

JOHN P. ZUR
Sunbeam v. p.-eng.

W. KENT KISE JR.
Carpenter Steel promotion

RUSSELL B. MILLER
Chicago Pneumatic sales mgr.

Pneumatic Tool Co., New York. He was manager, Atlanta district.

Lukens Steel Co., Coatesville, Pa., named **William D. Taylor** manager of the Fabricating Div. He was assistant to the vice president-administration. Other appointments: **Harry R. Meyer**, purchasing agent; and **Harry S. Beers**, superintendent of the Flanging Dept.

Richard M. Klaus was promoted from chief engineer to director of purchases of OPW Div., Cincinnati, of **Dover Corp.**

Bailey Meter Co., Cleveland, named **A. J. Hornfeck**, director of research; **J. E. McEvoy**, manager of product engineering dept.; **R. E. Clark**, manager of equipment engineering dept.; **J. K. Loeser**, manager of project engineering dept.; and **J. V. Werme**, manager of electrical engineering department.

Jerome L. Ross was promoted from assistant manager to general manager of the **Meaker Co.**, Nutley, N. J., subsidiary of Sel-Rex Corp.

William E. Andrus Jr., was appointed group director of standards, a new post, by **International Business Machines Corp.**, New York. He was systems standards manager for the IBM World Trade Corp.

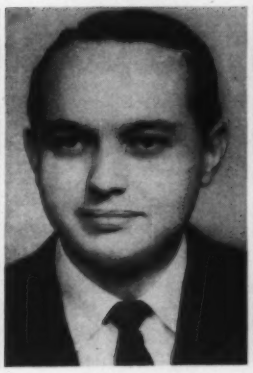
Ernest S. Wellhofer was appointed plant manager of the Monessen, Pa., plant of **Page Steel & Wire Div.**, American Chain & Cable Co. Inc. Succeeding him as Wilkes-Barre, Pa., plant manager is **Joseph H. Ritts.**

John R. Strom was promoted from technical director to vice president of both the **Roto-Finish Co.**, Kalamazoo, Mich., and the **Ransohoff Co.**, Hamilton, Ohio.

Robert P. Bennett has been appointed manager of the new Relay Marketing Dept. of **Cornell-Dubilier Electronics Div.** of Federal Pacific Electric Co., Newark, N. J.

DuBose Avery, a vice president of **Alcoa International Inc.**, has been named to the new post of vice president-commercial, with responsibility for all foreign sales and marketing activities, temporarily headquartering in London. **Robert P. Goodwin** was elected vice president of Alcoa International Inc. and managing director of Alcoa International (UK) Ltd., London.

WILLIAM D. TAYLOR
Lukens div. manager



RICHARD M. KLAUS
Dover div. promotion

A. J. HORNFECK
Bailey dir. of res.

JEROME L. ROSS
Meaker general mgr.

VIRGIL C. DOLLMAN
Wheeling Steel post

BERNARD J. MEZGER
joins Gleason Works

Virgil C. Dollman will become manager-tubular sales dept., of **Wheeling Steel Corp.**, Wheeling, W. Va., on Sept. 1. He has been assistant manager.

Frank J. Staral was made vice president-sales and engineering of **Alloy Engineering & Casting Co.**, Champaign, Ill.

Allis-Chalmers Mfg. Co., Milwaukee, has appointed **Dane T. Scag** assistant director of research.

Joseph A. Conlon has been named vice president-sales, Rubber Products Div. of **Dayco Corp.**, Dayton, Ohio.

T. Gordon Hame has been appointed manager of advanced development for communications in the Military Products Div., General Dynamics/Electronics Div., Rochester, N. Y., **General Dynamics Corp. Hanno Koegel** has been named manager of sound products engineering in the Commercial Products Div.

Bernard J. Mezger was appointed manager of technical co-ordination at the **Gleason Works**, Rochester, N. Y. He was a research and development manager with the Radio Corp. of America and the Curtiss-Wright Corp.

Hughes Aircraft Co., Culver City, Calif., has appointed **Lance P. Johnson** to the new post of product exploitation director. He will evaluate new products and develop additional applications for them where possible.

James A. DiMizio was made plant manager of **Electric Autolite Co.'s** Los Angeles wire facility.

OBITUARIES...

Lee J. Bussmann, 64, vice president and director of purchases, Bussmann Mfg. Div., **McGraw Edison Co.**, St. Louis, died Aug. 6.

Laurence A. Murphy, 60, senior vice president, **Deere & Co.**, Moline, Ill., died Aug 8.

Dominican Republic Plans Big Metallurgical Industry

IRON ORE will play an important role in the Dominican Republic's vast economic expansion program. Large deposits of high grade iron ore will be exploited, especially in the provinces of Sanchez Ramirez and Duarte. The government has retained Meissner Engineers Inc., Chicago, to head up the operation.

Studies by the firm will include a determination of ore deposits in the country, recommendations for the locations and mining and processing facilities, and the route for a rail line through the Yuna Valley to a port facility to be constructed on Samana Bay, near Punta Gorda.

• **$60 Million Project** — Meissner expects construction on the $60 million mining and processing facilities to begin this year and hopes to begin ore shipments 18 months later. The facility will be designed for annual production of 5 million tons of ore, but output may be doubled in three years.

Included in the government's long range plans is a thorough investigation of all mineral deposits, a preliminary study concerned with the installation of a major steel mill, and the establishment of a technical center to train engineers and technicians. Substantial deposits of manganese, nickel, lignite, cobalt, chromium, molybdenum, zinc, bauxite, and possibly petroleum are believed to be available. None has been developed.

Dr. Carl Stresino, economic adviser to the Dominican government and technical adviser to the United Nations, says negotiations are underway with the Massachusetts Institute of Technology, to arrange for a mission to the Republic to discuss the organization of engineering courses at the University of Santo Domingo.

Kaiser to Export Iron Ore

Kaiser Steel Corp., Oakland, Calif., has signed a ten year contract for the sale of 10 million long tons of iron ore to the Mitsubishi Shoji Kaisha Ltd., Japan. The ore will be produced at Kaiser's Eagle Mountain mine in Riverside County, California. Shipments will begin the latter part of 1962 at an annual rate of 1 million tons. The port of Long Beach, Calif., is building facilities to handle stockpiling and loading. The ore will be shipped to Japan in 50,000 ton ore vessels which will be constructed for Mitsubishi in Japan.

U. S. and Foreign Builders Sign Trade Agreement

Ingersoll Milling Machine Co., Rockford, Ill., and H. A. Waldrich GmbH, Siegen, Westfalen, Germany, will exchange advanced designs and technical knowhow. Ingersoll will build Waldrich heavy duty lathes and roll grinding machines in this country, while Waldrich will build Ingersoll special machines for the European market.

The two companies also will jointly establish a new company in Germany to supply milling and boring cutters and cutter blades and technical services to European customers. The new company, Waldrich Siegen-Ingersoll Werkzeug GmbH, will erect a new plant in the Siegerland area of Germany.

Bath Installs Big Press

Cyril Bath Co. is installing a 300 ton Toledo press in an addition to its plant at Solon, Ohio. The press will be used to test run customer parts on the new Cyril Bath blank holder —it fits into any press bed area and prestretches the sheet stock just prior to the forming operation.

Gyrotronics Inc. Formed

United Telecontrol Electronics Inc., Asbury Park, N. J., established a subsidiary, Gyrotronics Inc., to manufacture hermetic enclosures for electronic components and a variety of associated precision metal parts used in military transformers, delay lines, and wave filters. Other products will include capacitators, relays, attenuators, networks, and microwave components.

Plant Shutdown Scheduled

Automatic Sprinkler Corp. of America, Youngstown, will shut down its pipe and fittings shop in that city in about three months. The producer of fire detection and sprinkler systems will build a new shop in an undetermined location. A. J. Coakley Jr. is president.

Crane Forms French Firm

Crane Co., Chicago, formed a new French operating company, Cie. Crane, with headquarters in Paris. The new company was formed by merging J. Cocard, Lille, and Cie. Industrielle & Commerciale de Robinetterie, Raccords & Accessories, Paris. Cocard produces steel valves; the Paris firm makes brass and iron valves and fittings.

Nesco to Build Plant

Nesco Aluminum Ltd., Vancouver, B. C., will establish a fabricating plant in Regina, Sask., to make aluminum and steel roofing and siding. Other products generally allied to the construction industry will be fabricated at a later date. Nesco is part of the Kruger Organization Ltd., Montreal, Que.

Ziv Appoints Distributor

Ziv Steel & Wire Co., Chicago, has concluded arrangements under which L. R. Ward Steel Products Co., Dallas, will distribute the Ziv line of tool and die steels throughout Texas and Oklahoma.

DeVlieg Machine Expands

DeVlieg Machine Co., Royal Oak, Mich., has completed a 20,000 sq ft addition to its plant, representing an approximate 15 per cent increase in its 130,000 sq ft facility. "In addition to the building, a great sum of money has been spent for new advanced type of equipment to bolster our position, cost and quality-wise, to develop strength in the world market," says C. R. DeVlieg, president.

ASSOCIATIONS

James M. Black has been appointed executive vice president of the **National Metal Trades Association**, Chicago. He succeeds George Earl who is retiring after 33 years of service.

Dr. C. I. Whitman has joined the **Copper Products Development Association Inc.**, New York, as assistant technical director under Dr. C. H. Moore.

CONSOLIDATIONS

Crane Co., Chicago, has purchased substantially all the assets of **Deming Co.**, Salem, Ohio, maker of pumps. Walter F. Deming is general manager of the new division. Crane also acquired the operating assets of **Alliance Ware Inc.**, Alliance, Ohio, producer of pressed steel plumbing fixtures and porcelain-on-metal products. Alliance Ware is a subsidiary of American Metal Products Co., Detroit.

Sunbeam Equipment Corp., acquired **Mern Industries**, Oconomowoc, Wis., manufacturer of heat treating furnaces and equipment. The operation will be integrated with the Sunbeam line of furnaces at Sunbeam headquarters in Meadville, Pa.

Raytheon Co., Burlington, Mass., has offered to purchase **A. C. Cossor Ltd.** of England, manufacturer of radio, electrical, and scientific instruments. Cossor has ten subsidiaries and associate companies, including Beam Instruments Corp. Inc., New York, and Sterling Cables Ltd. of Canada.

The manufacturing company, **Florence Pipe Foundry & Machine Co.**, Florence, N. J., has merged with the sales and business subsidiary, **R. D. Wood Co.**, Philadelphia. The name of the consolidated firm is R. D. Wood Co. with headquarters in Florence.

Grieder Industries Inc., Bowling Green, Ohio, has merged into **Pines Engineering Co. Inc.**, Aurora, Ill. The manufacture and sale of Grieder high speed, tube cutoff machines, automation equipment, and special machinery expands the Pines line of tube fabricating equipment.

Humble Pipe Line Co., Houston, and **Interstate Oil Pipe Line Co.**, Shreveport, La., have merged as a wholly owned affiliate of Humble Oil & Refining Co., Houston. Name of the consolidated firm is Humble Pipe Line Co.

NEW ADDRESSES

Fluor-Singmaster & Breyer Inc. (formerly Singmaster & Breyer Inc.), engineering subsidiary of Fluor Corp. Ltd., Los Angeles, moved to 100 Park Ave., New York, N. Y. The Eastern area sales office of the Fluor organization remains at 589 Fifth Ave., New York, N. Y.

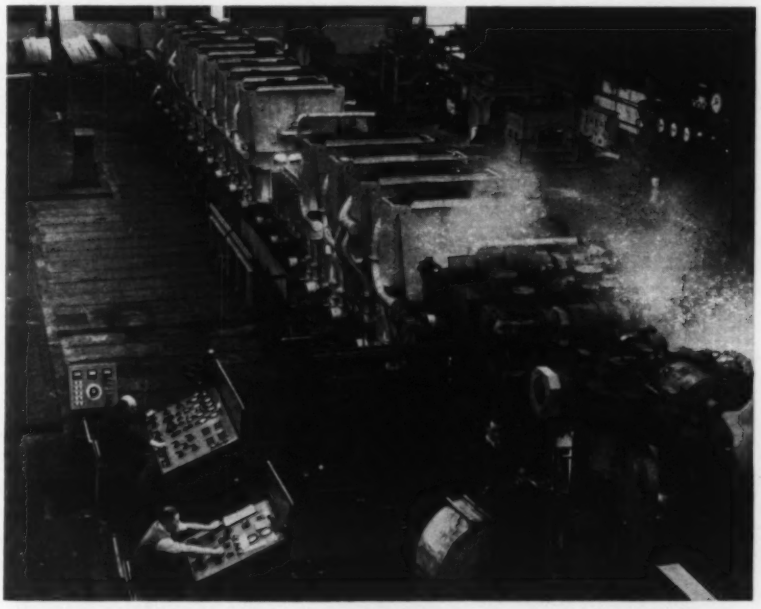
Multi - Amp Electronic Corp. moved to larger quarters at 61 Myrtle St., Cranford, N. J. Production area in the 15,400 sq ft building is about five times that of the former facility in Union, N. J.

Wah Chang Corp. moved its Fair Lawn Sales Div. to 17-01 Nevins Rd., Fair Lawn, N. J.

NEW PLANTS

Magnetics Div., Automation Industries Inc., Manhattan Beach, Calif., has moved into a new plant facility in Boulder, Colo. The facility is designed for the development and manufacture of technically sophisticated foil and wire magnetic components for aircraft, missile, space capsule, and advanced laboratory applications.

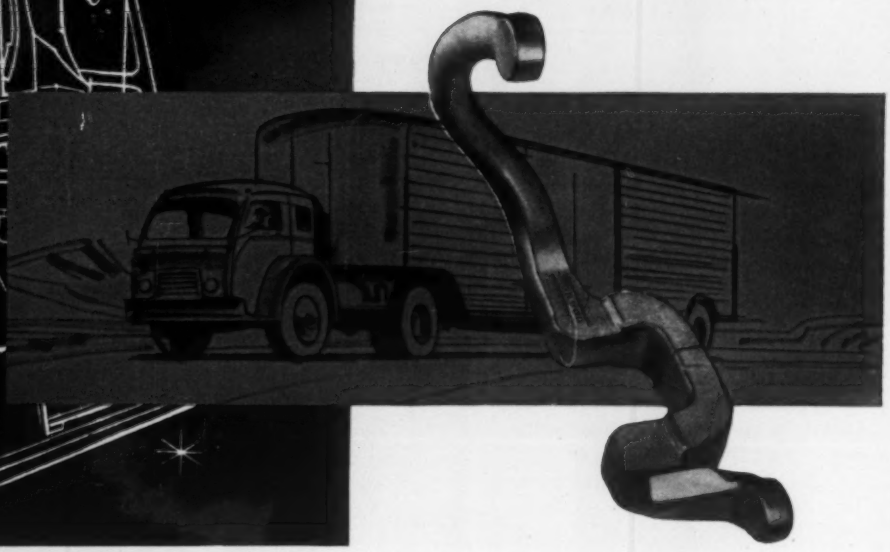
Willard Bronze Co., Cincinnati, opened a manufacturing plant in Graham, N. C., under the name of Willard Industries Inc.



Conversion Burners Boost Strip Output

OUTPUT of a Sendzimir, planetary hot strip mill was increased from 9 tons an hour to 15 by extending the slab furnace line and converting to distillate oil firing at Holmes Mills, Rotherham, England, of J. J. Habershon & Sons Ltd. High intensity oil burners were supplied by Incandescent Heat Co. Ltd., Birmingham, which had originally installed the gas furnaces. The mill didn't have to be shut down for the conversion because the furnace sections were on wheels and could be withdrawn from the line, one at a time.

REQUIRED SAFETY FACTORS in steering arm assured by designing it to be forged



Typical steam forging hammer

By designing with forgings, a truck manufacturer can count on the required safety factors, with minimum "beefing-up" of parts to offset unknown internal structures or non-homogenious materials.

You, too, can achieve results like these by designing *with forgings* either at the start or on re-design. The benefits of forgings are equally impressive, whether you make home-workshop equipment or diesel engines.

Forgings start as *better* metal . . . are further *improved* by the hammer-blows or high pressure of the forging process.

Write for literature on the design, specification, and procurement of forgings.

When it's a vital part, design it to be FORGED

Drop Forging Association • Cleveland 13, Ohio

Names of sponsoring companies on request to this magazine

GRINDING WHEEL STANDARDS—The Grinding Wheel Institute has contracted with the University of Michigan to conduct research on a method of grading grinding wheels. Based on a system of determining hardness (STEEL, July 3, p. 60), the work could lead to a standard method of grading grinding wheels.

RASER SLICES RADIO BARRIER—A new device called a range and sensitivity extending resonator (Raser) increases the range of two way, transistor radios by 43 per cent, states the Communication Products Dept., Lynchburg, Va., General Electric Co.

FORGING ADVANCE—A new digital control for automatic presses enables forging and planishing of parts to a high degree of accuracy. The system makes adjustments to suit the dynamic behavior of the press; hermaphrodite calipers for gaging aren't needed, says Schloemann AG, Dusseldorf, Germany.

CHECK ELECTRON BEAM RESULTS— A study of the effects of electron beam melting shows that interstitial and sulfur contents of cobalt are reduced and that ingots produced by electron beam melting can be turned into ductile cobalt sheets. You can get details by asking for AD 258,588, Office of Technical Services, Department of Commerce, Washington 25, D. C. ($2.25).

TOUGH JOB— By tempering 5 per cent chromium, hot work die steels below the point at which secondary hardness develops, you can obtain an increase in notch tensile strength. Result: A structure with relatively high retained austenite. Principal benefits will be seen in sheet materials for missile and rocket components.

FOUR COPPER NEEDS—Asked what they'd like in the way of copper improvements, scientists at Bell Telephone Laboratories listed these: 1. Better drawability of copper wire in gages finer than 40 B&S. Present breakage rates hurt the trend to miniaturization. 2. Rolled foil for printed circuits with surfaces compatible with adhesive bonding. Present rolled surfaces must be etched or otherwise processed. 3. A high strength copper conductor with good electrical properties would help eliminate need for the steel strength member in self-supporting cables. 4. While beryllium-copper is a good hardenable material, the scientists would like to see other hardenable grades that would cost less.

WHISKERS UP SILVER STRENGTH— Sapphire whiskers with an average tensile strength of 750,000 psi have been blended with silver to produce composites with a tensile strength of 118,000 psi, claims Missile & Space Vehicle Dept., Philadelphia, General Electric Co. A similar technique will be attempted with steel and refractory metals as a matrix. Problems: Difficulty in wetting whiskers, and a tendency toward porosity.

FROM ANGLES TO SPHERES— Angular particles of refractory compounds, such as carbides, become almost perfectly round when fed through a plasma jet, explains Stanford Research Institute, Menlo Park, Calif. Uniformity of shape allows accurate size classification. Such spheres flow exceptionally freely, pack into higher density configurations than unprocessed powders.

FUEL CELL PROGRESS— Electrodes treated with radioactive isotopes decrease polarization in fuels cells, improve efficiency, claims Yardney Electric Corp., New York. Techniques employed by the firm are also said to permit unusually flexible plate design.

HIGH POWERED ELECTROMACHINING— Anocut Engineering Co., Chicago, has built an electromachining power source that has a 10,000 ampere output. The company's largest previous power source was 3000 amperes. With the new unit, a machine is cutting irregular cavities in a high strength, high temperature alloy, removing up to 60 cu in. of metal an hour. Lynn Williams, president, told STEEL: "We think that the fastest electrical removal machine the Russians have is on the order of 12 to 15 cu in. an hour."

Captive or farmed out, experts tell . . .

How to Get Better Heat Treated

• IN MAKING mistakes in heat treating, everybody gets into the act. The designer, the metallurgist, the metal source, the production force, the heat treater, the inspector —even the stockroom clerk. The best medicine for the disease is preventive: Vigilant checking, combined with a knowledge of materials and processes.

By the time a part reaches the heat treating stage, much time and labor may have been expended. To turn out usable parts instead of scrap requires that each of the preceding steps, as well as the heat treating stage itself, be right. One man can pull a boner and nullify the best efforts of all the others.

STEEL asked several heat treating experts for their ideas on cutting down on heat treating flops. They represented commercial heat treating shops, plants doing their own heat treating, and manufacturers of heat treating equipment. To do the best job, they felt, you need to combine thinking on:

• Part requirements. This determines the needed hardness, depth of hardening, and similar factors.

• Material. The metal used will often determine whether the desired properties can be obtained by *any* method.

• Method. It combines with the material to set limits on the properties to be obtained.

• Inspection and control. Methods must be adequate to assure processed parts will meet service requirements.

• Many heat treating problems are created in the drawing stage.

Costs, quality, delivery, and production problems are often designed into the part before it goes into production, STEEL was told (see "Design for Profit Growth," July 31, p. 35). Good heat treating won't make a good part from a bad design or a bad material choice. Best answer: Check with the metallurgist and heat treater *before* the design is final, material decided on.

Dr. H. B. Osborn Jr., district manager, Tocco Div., Ohio Crankshaft Co., Cleveland, comments that an apparently simple change can cause all kinds of problems. In changing from carburizing to induction hardening, or in going from one material to another, the engineer can "fail to consider the inherent characteristics of the two materials or processes and simply transfer the heat treating specifications from one to the other. The result can be a requirement for the heat treater that is not only costly but occasionally impossible."

It seems hard to understand, but STEEL was told that often the heat treating department gets a batch of parts with instructions reading only "Harden," or possibly "Harden and Temper." Then the heat treater has to decide how hard is "hard." He shouldn't be blamed if the parts are not what is wanted —but he will be! He has to go back and check.

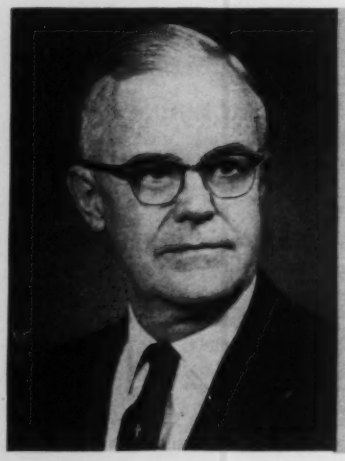
E. J. Pavesic, metallurgist, Lindberg Steel Treating Co., Melrose Park, Ill., spells out the things that may happen because of improper material selection:

• The part will not harden as desired. Causes may be too low carbon content or hardenability.

• Distortion may be excessive; parts warp so badly they can't be straightened or ground to size.

• Parts crack, feeding the scrap pile.

• Parts have heavy residual stresses; they will warp or crack when placed in service.



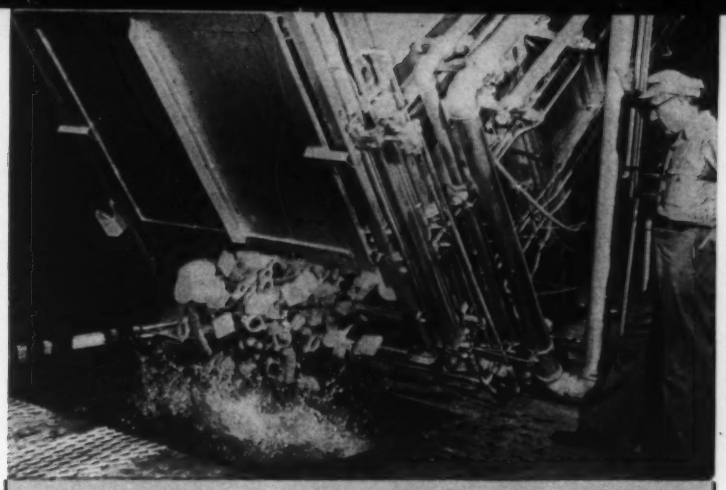
Choose the right equipment

for the job to meet the mechanical and physical requirements at the lowest cost.
—Stuart E. Sinclair, Greenfield Tap & Die

Watch time at heat.

Many parts are held too long, increasing costs, causing surface problems, cutting production.
—T. A. Frischman, Eaton Mfg. Co.

Work



• Parts won't machine properly.

The wrong material may be chosen because of a lack of knowledge of its capabilities, because of an ill advised desire to cut costs of the metal or the machining step, or because the proper material is not readily available, Mr. Pavesic adds. Deseigners will even pass the buck to the heat treater, blithely assuming he'll save the day with some fancy processing.

B. F. Rassieur, president of Paulo Products Co., St. Louis, adds another warning note. Even the best of the nondeforming tool steels can "move" in hardening, with the amount depending on the part configuration and the heat treatment needed. In the same vein, a reasonable tolerance for straightness will cut costs. Straightening is a hand operation, thus time consuming and expensive.

• **Before the part reaches the heat treating department, other errors can occur.**

Here's where the stockroom can cause heat treating troubles. A common mistake: Issuing the wrong steel; even worse, mixed steels so that a lot may be made up of more

In the Design Stage

Start with the part requirements.
Relate both material and heat treatment to properties.
Heat treat changes may necessitate material changes.
Allow for distortion or size change; proper choice of material and process can hold them down.

Prior to Heat Treatment

Make sure the specified material has been used.
Plan stocking practice to avoid mixed lots.
Check heat treating instructions—Right for part and material?
Allow enough time in scheduling.

In the Heat Treating Shop

Check instructions. Have changes been made since the last time the job was run? (Does it mean an improvement—or a mistake?)
Check thermocouples, instruments, contactors, timers, valves.
Make sure you measure temperatures at the right point.
Test atmospheres and salt baths for proper balance.
Check quench baths for temperature and composition.
Standardize test equipment regularly.
Maintenance procedures—Both adequate and regular?
Avoid overheating, underheating, nonuniform heating.
Plan to get the most from your equipment.

Consider material, design.

Poor choice can make effective heat treatment difficult or impossible.
—E. J. Pavesic, Lindberg Steel Treating Co.

Adjust for process nature

in design or changes. Take advantage of process characteristics to save money.
—H. B. Osborn Jr.—Tocco Div., Ohio Crankshaft

Maintain tight control

of quality; keep records of detailed processing of all jobs so they can be repeated.
—B. F. Rassieur, Paulo Products Co.

Keep a shipshape shop.

Attention to maintenance, loading, and quenching conditions pays dividends.
—O. E. Cullen, Surface Combustion

than one alloy. The wrong steel may mean total loss of the part, excessive warpage, grain growth, or the inability to obtain the desired hardness. Mixed steel lots can require expensive and difficult sorting, or the expense of reruns if the error is not detected until after processing.

Watch out for changes. Substitution of one grade of steel for another is common practice. Such changes may not pose a problem for the heat treater—provided he knows about them before the work is processed. Most well run shops have a definite procedure worked out for each part, based on the steel and the part requirements. Where changes are concerned, ignorance is far from bliss for the heat treater; he may turn good parts into scrap, or be faced with the added cost of reruns.

Says Mr. Rassieur: Between the print and the heat treat, you should watch for these mistakes that can add to costs, cause delays in production:

- Wrong identification of material.
- Mixed material lots.
- Wrong heat treat specification (watch those clerical errors!).
- Time—A 4 hour carburizing cycle takes 4 hours, plus the time to ready the furnace, load, unload, and carry out following steps such as quenching and tempering. It makes no sense to take hours or days to make a part, or a lot of parts, and then try to save half an hour on the heat treating at the expense of a possible poor job.

• Good results from the heat treating department depend on proper equipment, proper operation, and proper inspection.

O. E. Cullen, manager, research and development Surface Combustion Div., Toledo, Ohio, Midland-Ross Corp., observes that the cost of heat treating equipment makes it a long term investment. It will not be replaced or remodeled frequently. So the heat treater, he feels, should check into minor details to utilize his equipment to best advantage. Noting the frequent statement that "there is no substitute for a good operator," he adds that the same can be said for maintenance.

Stuart E. Sinclair, chief metallurgist, Greenfield Tap & Die Div., Greenfield, Mass., United-Greenfield Corp., concurs in the belief that choice of equipment is most important. It determines whether it is possible to process parts satisfactorily, in appropriate quantity, and in an economical manner.

• Type of furnace should be matched to the job requirements as far as possible.

Mr. Sinclair points out that there is an application for box type furnaces with no atmosphere control, if the parts are not critical as to dimensions or surface condition. It is low in cost, simple to maintain.

When parts are medium or small in size, and in suitable and regular volume, a salt bath would be considered, says Mr. Sinclair. Its advantages include small floor space requirements for its capacity, control of surface, minimized distortion, and high quality heat treatment. On the debit side is the requirement of sufficient volume, since the bath should be operated as nearly continuously as possible; cost of salt may be fairly high; washing of parts to remove salt; and control of bath composition.

Controlled atmosphere furnaces, Mr. Sinclair comments, offer great versatility; by changes in the atmosphere, they can be used for carburizing, carbonitriding, hardening, brazing, and other operations. Operating personnel must be able to maintain and adjust the generating equipment to provide the proper atmosphere if wanted results are to be obtained.

Induction hardening can't be neglected as a flexible means of heat processing, says Mr. Sinclair. It can do much more than mere localized heating: Hardening, case hardening, brazing, and other processes. Again the operator must know how to use the equipment to get out of it the best results.

• Proper controls are essential, and their effective maintenance is imperative.

T. A. Frischman, chief, metallurgy and quality control, Axle Div., Eaton Mfg. Co., Cleveland, warns that thermocouples aren't always placed in the proper position in a furnace. In rotary furnaces, they are sometimes placed too close to the discharge door; when the door opens, the thermocouple is cooled and the

balance of the unit is therefore overheated. Samples should be taken in representative locations throughout the charge if they are to give a valid picture of the results. Mr. Sinclair suggests that one way to overcome the problem is to take a temperature survey of the furnace under load to uncover variations. He recommends a regular check of the furnace thermocouple against a portable standard. Mr. Cullen adds that poor burner adjustment in an atmosphere furnace can contribute to nonuniform operation and that plugging of atmosphere gas inlets can result in nonuniform atmosphere in the furnace. Controls on the atmosphere generator are usual and they should be checked for proper operation.

• Quenching should be controlled too, the experts agree.

"The quenching method and media influence over-all hardness, depth of hardening, distortion, cracking, and soft spots," says Mr. Sinclair. Mr. Cullen, recognizing that the quenching step is often taken for granted, stresses its importance: "Good quenching practice is a major contribution to good heat treating results."

For good quality control, Mr. Rassieur advocates continuous control of brine concentration and temperature control of all quenching baths. For oil quenching, temperature of the oil can make or break a job. Mr. Frischman notes that a common "100 at 100" oil may have a Saybolt viscosity as high as 210 seconds at 70° F, yet only 57 seconds at 140° F, its normal working temperature. Mr. Cullen cites a job of hardening shifter rails 1 in. in diameter and 14 in. long, made of SAE 1141 steel. They "went out" as much as 0.026 in. using oil at 140° F; when quenched in oil at 300° F, the maximum distortion was cut to 0.005 in.

Another common problem is water in the quenching oil. It comes in from leaks in the water cooling system used to restrain oil temperatures, by splashing from nearby water quench tanks, or even from holes in the roof. Continuous oil purification equipment is a good investment, or water can be driven out by heating the oil.

• Competent, trained operators help to get the best from equipment.

With production needs constantly changing, the skill and experience of qualified operators is a big help in solving problems. They can help in setting up the initial procedure, based on their experience with the equipment. Each new job presents its own loading problem, for example, if the work is to be uniform in properties and at the same time the furnace capacity is to be used effectively.

Mr. Rassieur believes that the operator should not set the production pace. In laying out the job, the equipment capacity and test runs have permitted a calculation of the production rate. Don't leave it at this—the shop should know what the production rate should be. Mr. Rassieur recommends a regular followup check.

• Inspection helps to cut errors, build quality.

Heat treating shop inspection practices should include checking of the equipment as well as the parts, and the parts themselves should be checked often enough to assure continual good work. It's simple enough to run a hardness check—so why wait until the end of the day?

Inspection should include the temperature and generator control equipment, salt bath composition, and the test equipment itself. It can lead to changes in maintenance practice (preventive maintenance is best, of course) by pointing out such things as furnace leaks. Mr. Frischman points out that carburizing furnaces in particular should be tight and under positive pressure; added natural gas is a poor corrective measure for a leaky furnace. Using high methane content instead of repairing a leaky furnace can cause carbon buildup and short working life for furnace parts, and can be responsible for high retained austenite in carburized parts.

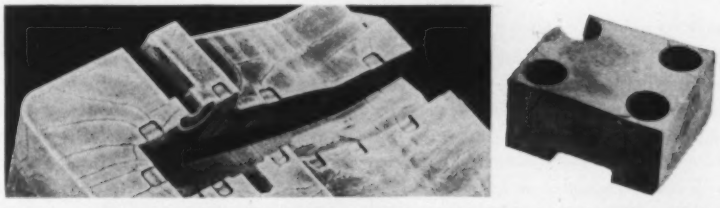
Checking furnaces should be a regular routine, Mr. Sinclair observes. This should include the thermocouples, the control instruments, and any associated equipment, timing devices on induction units, and all electrical contacts and controls.

Mr. Sinclair sums it up this way: "Mistakes within a heat treating department can be many and varied in nature. But the basic policy of so processing the parts that the physical and mechanical requirements are produced at the lowest possible cost will help to keep mistakes at a minimum level."

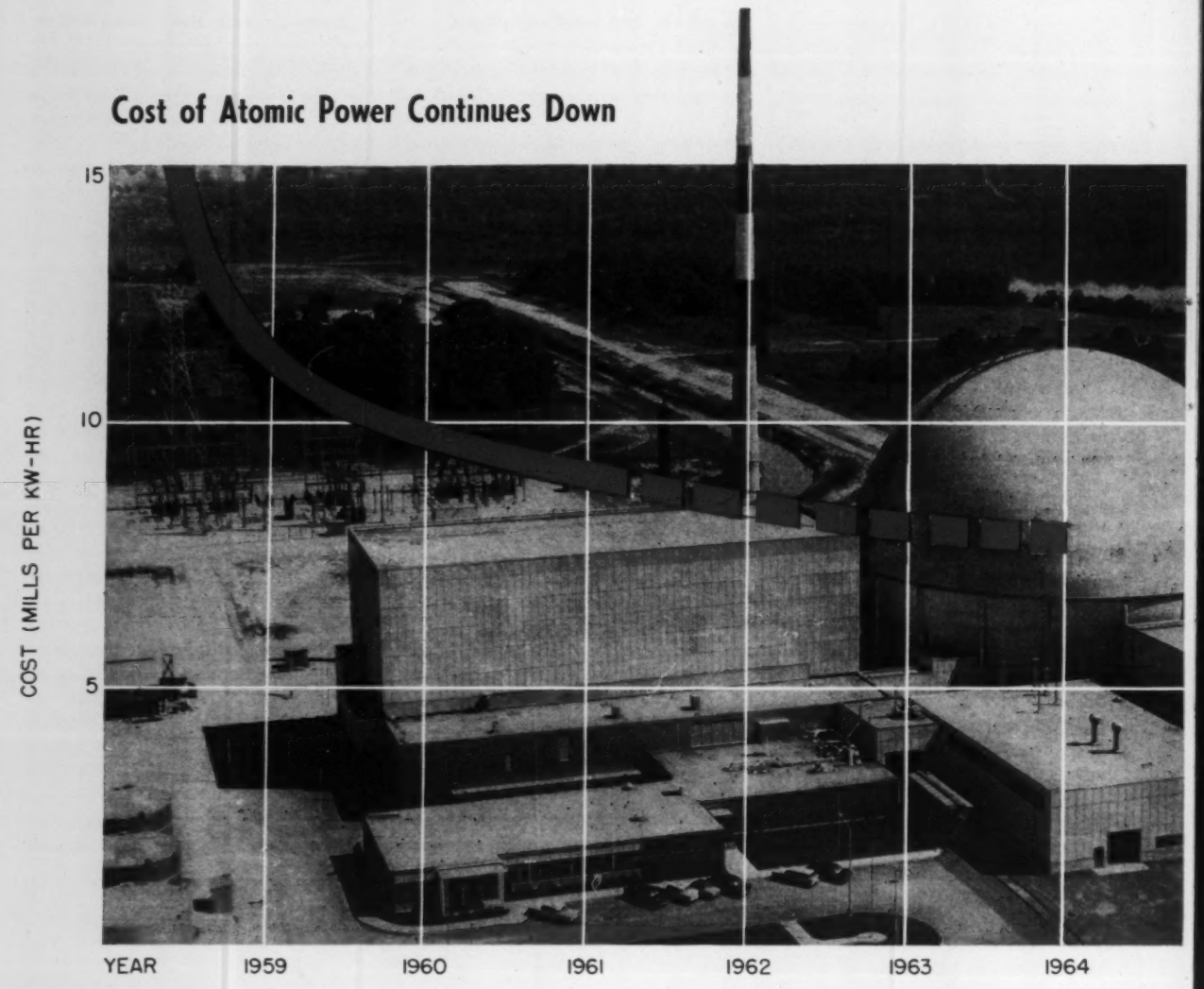
• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

From a Heat Treating Rogues' Gallery . . .

come these examples. Die (left) was oil hardening steel—but there was water in the oil. Poor design, too rapid heating caused cracking (right)



In the wrong atmosphere, high chrome die picked up too much carbon (left). Wrong material; nondeforming, not water hardening steel should be used (right)



As technological changes cut costs, you'll see . . .

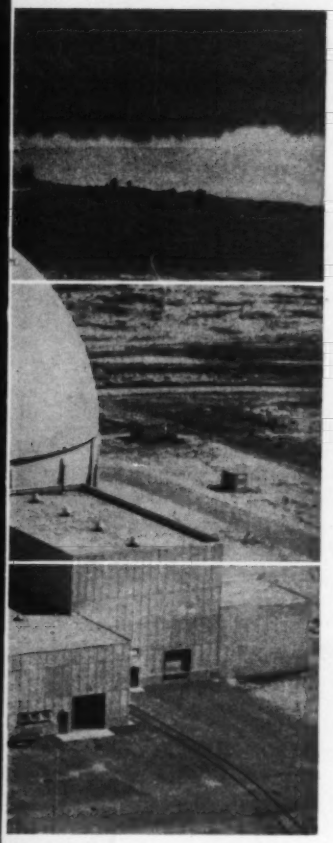
More Growth for Industrial Atomic

• YOU CAN PLAN on more power from atomic sources, but the timing depends on the solution to technical problems. The experts disagree on schedules, but not on trends. For metalworking, changing markets and a helping hand on power costs are indicated.

Supplies of nuclear fuels appear adequate, so far. Recovery of the energy available in the atom is inefficient and improvements can be expected to cut cost of producing power. Waste disposal is a problem for most powerplants (exceptions: hydroelectric, tidewater, or volcanic steam units); for nuclear plants, volume of waste is small but laden with radiation hazards.

• Electric power use is expected to increase sharply, increasing drain on energy sources.

The Edison Electric Institute estimates that power companies will produce about 1.2 trillion kw-hr by 1970, and more than double that



Power

again (to 2.3 trillion kw-hr) by 1980. The 1970 figure is double that of 1959.

Titus G. Le Clair, General Atomics Div., San Diego, Calif., General Dynamics Corp., has pointed out some of the problems in producing such huge quantities of electrical energy by conventional methods. He assumes that all of the power in the Chicago region is produced by coal, and that the amount doubles every decade for 40 years. To ship one day's requirement of coal for the year 2000 would then require 100 trainloads, with 100 cars in each train! Starting with that amount of coal, you can make your own guesses as to the problems of disposing of the ash that would result, and the gaseous products of combustion including sulfur dioxide. Not now a major problem, the utility industry must face the changes as power use grows.

• Fossil fuels have other uses, which should make them increasingly higher in cost.

Petroleum is the starting point for many chemicals used for fibers, antifreeze, solvents, detergents, plastics, fertilizers, and many other products. Processes have been developed for coal as a similar starting point for complex compounds. Those uses will affect pricing; as chemical uses increase, fossil fuels could have a higher value as a chemical raw material than as a means of producing heat.

Complicating the picture are new processes being considered for "mining" coal. One, which can handle seams too narrow to take out by conventional means, involves burning the coal underground and collecting the products of combustion. Under the proper conditions, the gases will have value as fuels or as chemical raw materials.

• Cost of power from nuclear reactions is coming down.

While there has been a rapid downtrend in the cost of making power from nuclear sources, the drop will be less precipitous in the future. The curve showing the change is leveling out. Improvements in the techniques for power production will cause a further drop, and if uses can be found for the byproducts of the reaction, an additional means of cutting costs will be available.

The outlook, the experts claim, is for lower costs of atomic power. For some purposes, it may be the only practical way of generating power; developments will spur processes for more mundane service. Dr. Glenn T. Seaborg, chairman of the Atomic Energy Commission, told the Army Ordnance Association, "On the basis of present scientific knowledge, I believe that nuclear propulsion could provide the most feasible means of accomplishing long voyages in space." He mentioned nuclear rockets for propulsion, and systems for nuclear auxiliary power (SNAP). Thrust power of rockets is measured in terms of specific impulse, which relates thrust to pounds of propellent flow. Maximum value possible by chemical reaction is about 475; in a nuclear rocket, using hydrogen as the propellent, specific impulses above 800 could be obtained, says Dr. Seaborg. It is granted there will be major technological problems in such a project, ranging from materials to withstand the reactor conditions without interfering with the reaction, to mechanical concepts to hold down the structure weight. Successful completion of the development work (Project Rover) will lead to the ability to accomplish missions not possible with chemical rockets.

While much of the development work in atomic power has come because of military interest, proponents such as A. R. Luedecke, general manager of the Atomic Energy Commission, look for early commercial use of the process. Says he, "We are confident that by about 1968 nuclear power will be competitive with that from fossil fuels in large stations of 300,000 kw or more in high cost fuel areas such as New England and the Pacific Coast."

Mr. Le Clair states that 132 electric utilities are participating in one or more of 26 atomic energy projects. So there's quite a bet riding on the idea that atomic power can be made competitive.

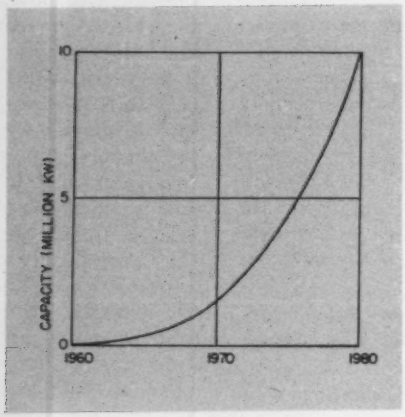
The Shippingport (Pa.) atomic powerplant, completed in 1957, is rated at 60,000 kw and produced power initially at a cost of 50 mills per kilowatt-hour. Near Chicago, the Dresden station produced power initially in April, 1960; cost is expected to approach 7.5 mills, or 10 mills if all of the research and development costs are included.

• Further reduction in costs will be needed, and will come harder.

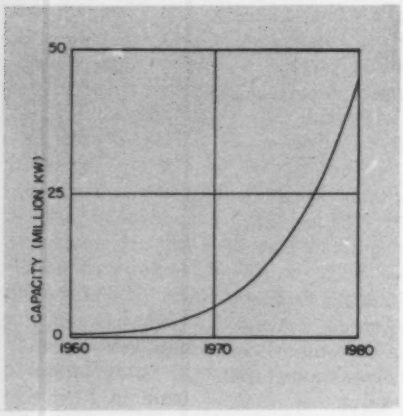
In checking with the leaders of about 40 organizations, Mr. Le Clair found that they expected

Nuclear Power Capacity Estimates

Equipment Purchases



Total in Place



the costs of fossil fuels to go up an average of 12.9 per cent in ten years. Nuclear fuel costs, they thought, would drop 9.4 per cent. The net change would favor nuclear production, although the fuel cost is only a part of the total cost of producing power.

With plants of 300,000 kw output being readied for operation in 1963 or 1964, Mr. Le Clair expects total costs of 8 mills.

Even that can be bettered. For steam turbine plants, it will be necessary to increase the temperature that the reactor can withstand, bringing steam temperatures to the levels today's turbines can use.

Improvements in the length of time and degree of fuel use, before reprocessing is needed, are expected. They will cut the cost further, and plants with a total fuel cost of 1.5 mills per killowatt-hour are visualized within present technological concepts. Mr. Le Clair looks for lower costs for uranium; that would help further in reducing the atomic fuel expenses.

• It is true, Mr. Le Clair notes, that in going to atomic power we are swapping one set of problems for another.

The problems of disposal of atomic powerplant wastes, which would probably be radioactive, are not simply solved; but he feels they may be easier as power use climbs. To compare the two sources, he uses a 1 million kw plant as an example. The spent atomic fuel resulting from the operation of the plant for 30 years could be stored in a ¼ acre vault 20 ft deep. Ashes from a coal fired plant of the same output would take 1000 times the volume, says Mr. Le Clair, and that does not take into account the disposal of the sulfur dioxide from the burning coal.

Walter G. Belter, of AEC's Division of Reactor Development, quoted studies to the Purdue Industrial Waste Conference that indicated a cost for perpetual storage, in present design tanks, of 0.1 to 0.15 mills per kilowatt-hour. Other methods of disposal, such as underground storage in salt deposits, or impervious rock strata, may be better. One unusual method: Combining wastes into ceramic or glass.

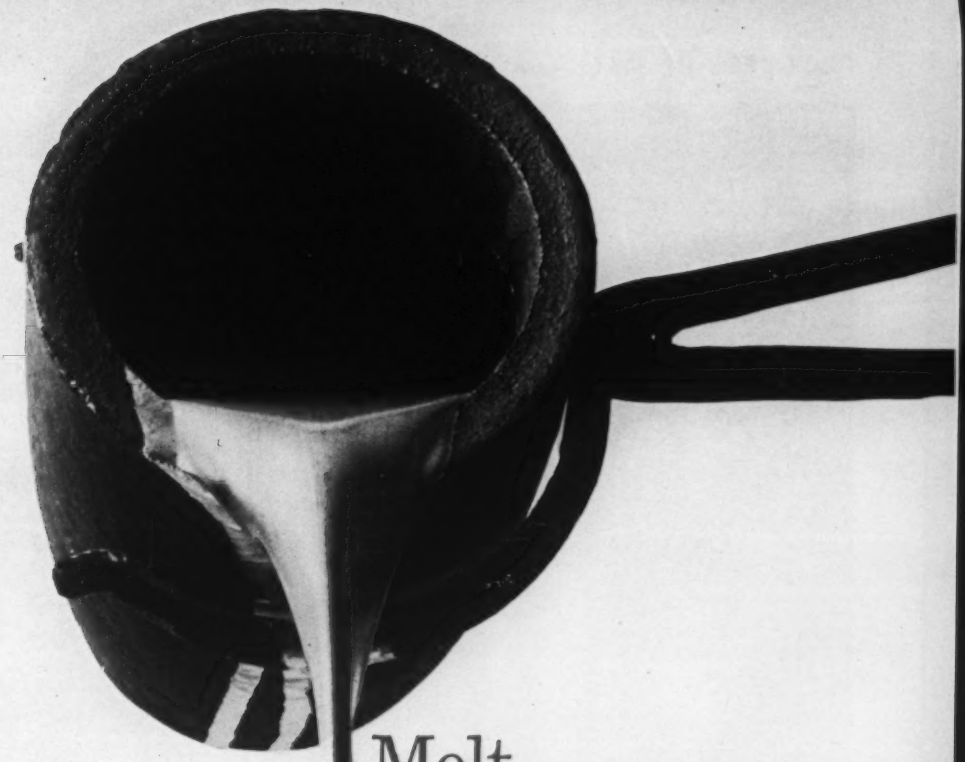
• The government is trying to encourage private participation in the development of atomic power.

Announcement of an Office of Industrial Participation in the Atomic Energy Commission in May of this year set up a formal mechanism for industry to obtain information on private participation and investment in the development and use of atomic energy. The group, under Ernest B. Tremmel, will also study industrial type operations planned or performed by AEC contractors and recommend policies for transferring them to private industry when possible. It will also check on effectiveness of the program.

Security considerations can't be neglected. Nine years ago, Dr. T. Keith Glennan—then AEC commissioner—put it this way: "Let there be no mistake about it. Industry will get only those things that it can prove that it really wants, it really can handle, and it really should have in the public interest." Companies planning to enter the field will be expected to pick up much, or all, of the check.

• Safety measures will be involved and costly.

Part of the fixed cost of any atomic powerplant will be the charges for the safety measures that will be needed. That can be predicted, and the reactor design should preclude the possibility of running away. Safety records in the atomic industry up to now are good, notes Mr. Le Clair.



Melt aluminum?

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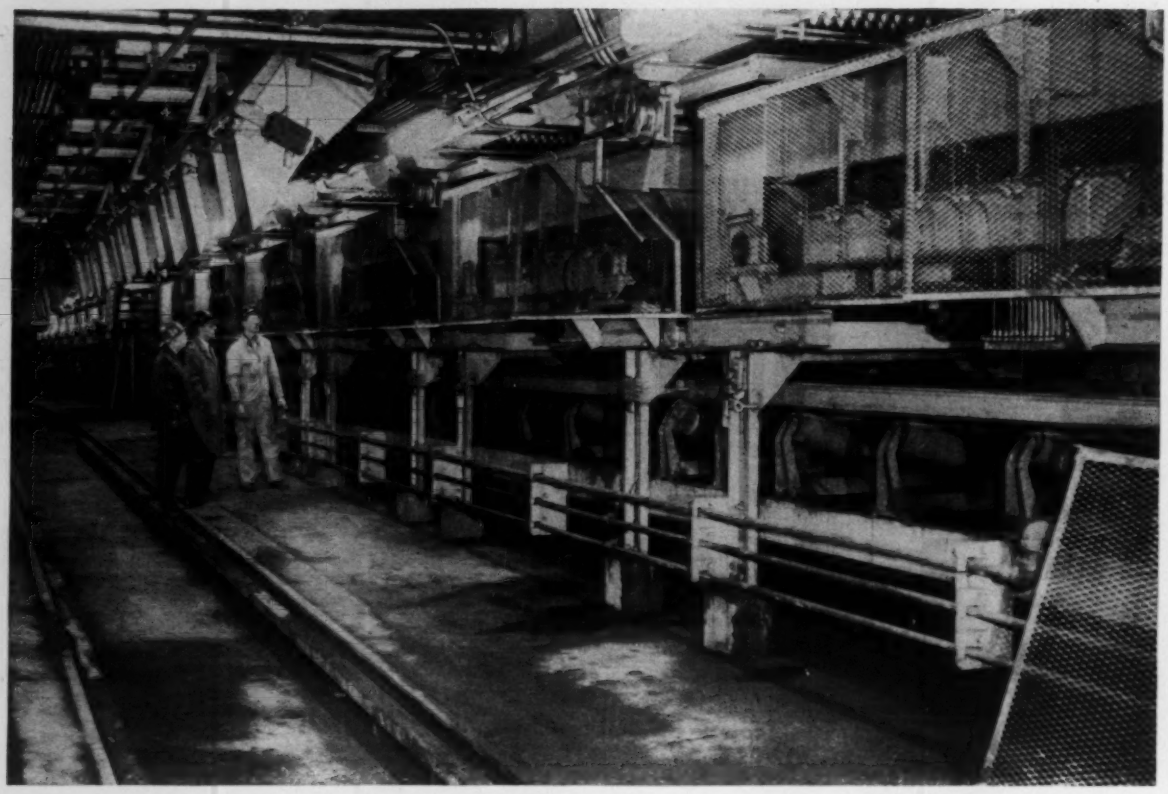

Automated conveyors proportion raw materials and deliver them to the skip hoist

Blast Furnace Stockhouse Is Mechanized, Programed

Current technology can provide the raw materials, high top pressures, and blast enrichment—oxygen and fuels—to obtain almost twice the designed output from existing blast furnaces, insuring adequate hot metal for iron-hungry, pneumatic steelmaking processes. But material systems must be updated to keep pace. Here's what one steelmaker has done.

• AN AUTOMATED stockhouse is feeding one of the blast furnace stacks at United States Steel Corp.'s Gary (Ind.) Works.

The system was designed by Meissner Engineers Inc., Chicago, with assists from U. S. Steel's engineers and production specialists. A punched card, programing system (Prodac) was supplied for the stockhouse by the Systems Control Dept., Buffalo, Westinghouse Electric Corp.

• Fast, accurate determination of charge weights speeds the feeding operation and provides closer control of ironmaking chemistry.

Raw materials used in the production of iron are automatically withdrawn from a series of storage bins in the proper proportion, delivered by conveyor to the skip cars, and fed into the blast furnace in a predetermined charging plan. Result: Fluctuations in the smelting process are minimized.

Proportions of materials can be changed immediately, through selector switches in the programing system. The operator can quickly set up or change the program, which includes the sequence of skips, the material included in each skip, and the bin in which the material is stored.

Ores and fluxes are kept in 14 hoppers served by two main conveyors. Material from each hopper passes over a weighing conveyor before it is deposited on the main conveyor. A sensing device on each weighing conveyor produces a digital pulse for each 50 lb of material delivered. Design of the digital system makes it possible for two hoppers to deliver material onto a main conveyor simultaneously, and reduce over-all charging time. Volumetric feeders deliver coke to the conveyors.

• An accurate account is kept of charge weights and times.

Immediately after charging is

giant guardian...

Four football fields could be laid out on the flight deck of the giant, nuclear-powered U.S.S. Enterprise—the world's largest ship. But size isn't the only dimension that makes the Enterprise outstanding. Pressurized water nuclear reactors, producing over 200,000 horsepower, will drive her at speeds in excess of 25 knots. She will be able to sail the seven seas for several years without refueling.

Carlson corrosion and heat-resistant stainless steel plate was used in this huge Attack Aircraft Carrier, and in her nuclear power plant. The builders of the Enterprise have confidence in the stainless plate produced by Carlson specialists. Exacting quality standards and dependable delivery result from such specialization.

Whether you are building a gigantic ship, a nuclear power plant, or corrosion-resistant process equipment, we can help you make it best. For practical assistance in filling your requirements for stainless plate in a wide range of grades and sizes, contact Carlson.

Our new booklet, "Producing Stainless Steels . . . Exclusively," is available. Write for your copy now.

Photograph of the launching of the U.S.S. Enterprise. Courtesy of Newport News Shipbuilding & Dry Dock Co.

OFFICIAL U.S. NAVAL PHOTOGRAPH

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completed, the system provides a record of weights and an accumulation of other data on charging operations—read out on a punched, paper tape.

The automatic data accumulation section of the control system records the weight of each material used and the time at which it was charged into the furnace. That makes possible a complete breakdown for accounting purposes and permits correlation of the charging program with the product.

• The automatic charging sequence includes adjustments for changing conditions in stock bins.

Example: If one bin of a given material is exhausted, the control system automatically selects another bin of the same material. It also indicates that the first bin is empty.

If the chute of a bin is clogged, the system actuates a vibrator. If vibration doesn't restore material flow, an alarm is sounded and a light is turned on to indicate which bin is jammed. Another bin of the same material is put on stream and programed operation continues.

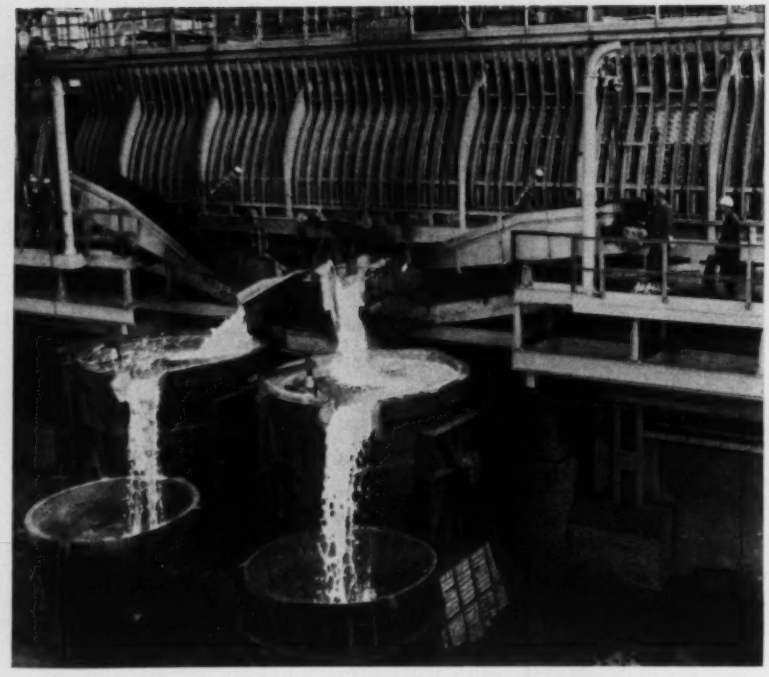
• Subsystems can be taken out of operation individually or in groups while the over-all, automatic cycle continues.

Either of the two coke subsystems can be switched on or off independently, or one side of the system can be switched on for emergency operation. Automatic operation continues but the coke is drawn from emergency bins, bypassing conveyor and screens. The entire coke system can be operated manually leaving the rest of the stockhouse on automatic. Or the whole coke system can be switched off. Coke would then be delivered by a conventional scale car which has been retained for emergency use.

The metallic-flux feeding system can be cut off and materials delivered by the scale car. Or either side of the metallic-flux system could carry the load if one of the collector conveyors failed.

Completely manual operation of the stockhouse would be necessary only in case of power failure or failure of the logic system.

Maintenance is minimized; malfunctioning weight feeders or logic boards can be withdrawn from the system and replaced with spares.



Large heats require split spout, two ladles . . .

Open Hearths Still Popular In British Melting Shops

• OPEN HEARTH steelmaking is getting a vote of confidence in Great Britain. Example: A 400 ton furnace of the Maerz-Boelens type has been installed at Abbey Works, Steel Co. of Wales Ltd., Margam, South Wales. It is the first of four to be installed.

Additional output from the new open hearths, and from the oxygen-steam bessemer shop at Abbey Works (see STEEL, Feb. 13, p. 116) will more than match the capacity of an obsolete melt shop at Port Talbot.

• The furnace was pre-erected, then moved into place over slag pockets left from an older, smaller unit.

The frame was put together at the end of the shop (350 ft from the operating site) and hauled into a position formerly occupied by a 200 ton open hearth.

The pre-erection technique is said to be new in Britain, but it has been employed successfully in the U. S. (For example, it has been used at Great Lakes Steel Corp., Detroit, a subsidiary of National Steel Corp.)

Walls and roof of the new furnace are built in sections, so changes can be made more rapidly than in conventional open hearths.

The furnace has a firing rate of 1250 gallons of fuel (oil) per hour and is equipped with electrostatic precipitators for dust extraction.

Evaporative cooling is used for the door frames. Clean water passes through the frames and is extracted as steam, with steam from the waste heat boiler.

TRANSFERS - DEPILERS - PUSHERS
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How to Get More from Chemical Milling

• AT LEAST part of the success or failure of chemical milling must be laid in the lap of the user, Joseph E. Trankla, general manager, Anadite Inc., South Gate, Calif., told the American Society of Mechanical Engineers at its summer meeting.

"Chemical milling (shaping parts by controlled chemical etching) is giving the designer more latitude in original design, and is indeed approaching a state of science," Mr. Trankla said.

"The greatest progress can be made toward maximum use of present chemical milling potential if there is closer liaison between designer and chemical miller."

• Some guidelines to better parts at lower cost may help, Mr. Trankla said.

"In addition to the rule of not specifying higher quality than you really need, as users of chemically milled parts or material you have several other ways to get consistently better results at less net cost."

First: "Don't tell the chemical miller how to do it." You should know what you want, but the chemical miller should know most about how to get it. If you trust him with the job, let him be the judge of processing, he said.

Second: "Permit optional elimination of welds." Mr. Trankla illustrated this point with an example: A part print showed a welded-in piece forming the bottom of a deep pocket, with the notation, "chemical milling optional." Anadite chemically milled the whole pocket. The parts were rejected, the customer then explaining that the option meant the pocket bottom could be chemically milled before welding. Anadite had to cut out the pocket bottom, make a new piece, and weld it in place.

Third: "Provide oversize stock." Stock ought to be at least 0.003 to 0.005 in. thicker than the maximum specified part thickness to eliminate hazards due to thin spots or small but damaging scratches.

Fourth: "Don't grind or polish material before chemical milling." Mr. Trankla said minute scratches are hard to get out, and grinding sometimes can hide flaws that chemical milling will expose.

Fifth: "Eliminate unnecessary presizing." The only time presizing (by chemical milling) seems to be necessary is when the material is to be used for a welded assembly prior to finished chemical milling.

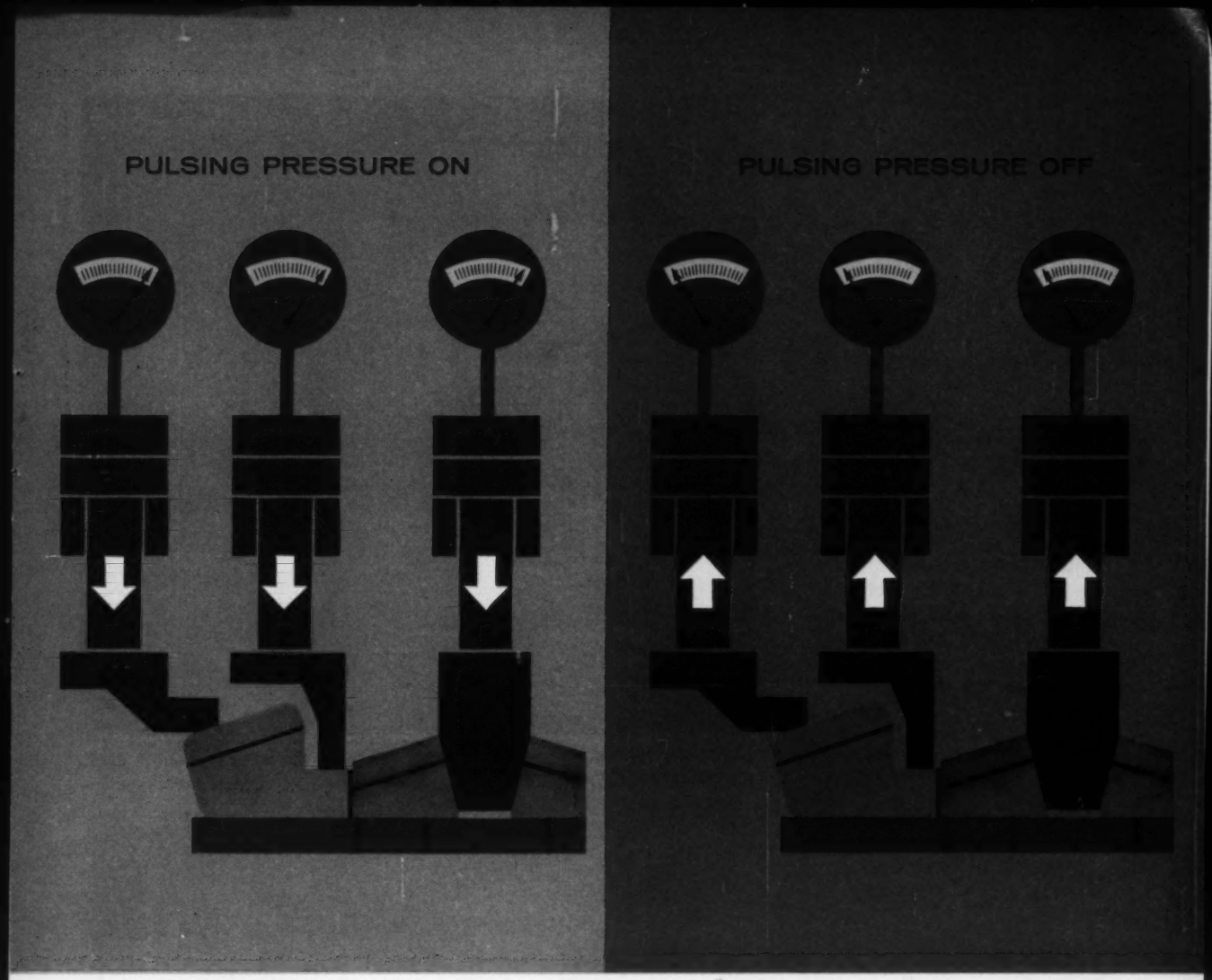
Sixth: "Understand the effects of radius resulting from chemical milling cuts." Generally, the radius at the base of a cut is equal to the depth of the cut. That is particularly important when the area is to be used for bonding, as in honeycombs. There should be no runout or dishout from the radius to the base of the cut.

Saw Cuts Jumbo Aluminum Alloy Plates

CUTTING ALUMINUM alloy plates in the 5000 group is a typical job for this highly automated circular sawing machine at Kaiser Aluminum & Chemical Corp.'s Ravenswood (W. Va.) Works. The unit can take material 64 ft long, 14 ft wide, and 6 in. thick.

The setup uses a rip saw (30 in. diameter) with 64 ft of travel, a 14 ft travel crosscut saw, and a 14 ft travel end trim saw, all integrated to facilitate simultaneous operations.

The rip saw has carbide tipped cutting edges and is driven by a 60 hp motor. Peripheral speed: 12,000 fpm. Feed rates of 5 to 45 fpm are available during the cutting cycle. Rapid return rate is 200 fpm. Builder: Loma Machine Mfg. Co. Inc., New York.



New Quenching Machine pulsates to eliminate distortion

The pulsing feature of the No. 529 Quenching Machine allows the use of high pressures to control distortion of parts under quench. Pulsing, which is a way of alternately applying and releasing pressure on the part, allows for the natural contraction of the part . . . and eliminates stresses in the part-die relationship.

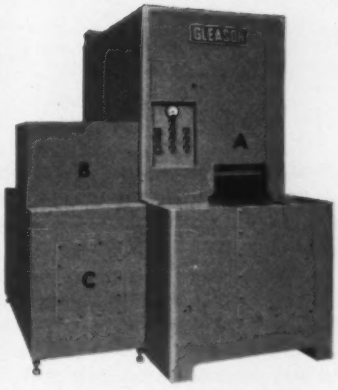
You get tremendous latitude in control of the quench, since as much as 200 gallons of oil can be pumped over the parts.

Simply preset the oil flow with valves and timers, and you have the following automatic cycle: start with a fast quench to set the part, switch to a lower rate; then finish with a rapid quench or vary the sequence any way you wish.

The hydraulic system has a maximum of 1000 pounds of pressure per square inch; a combined total of 50,000 pounds of pressure is available on this machine.

You can handle parts up to 10½ inches in diameter and 4 inches high in the No. 529 Quenching Machine. And it is available in three variations; by adding units as shown in the caption, production is greatly increased.

Drop us a card, and we'll send you more data on specifications and operation.



The basic No. 529 Quencher (A) is manually loaded and unloaded. Automatic unloading (B) is easily added. An auxiliary quench chamber (C) can be added for high production work.

GLEASON WORKS

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

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Racing for mundane markets, turbinemakers are swiftly closing the cost gaps between their product and piston engines. Here's a late rundown on advantages and progress, and a look ahead . . .

Jeep is propelled by this 23 lb, 75 hp jet developed by Williams Research Corp., Walled Lake, Mich. Costs will soon be comparable with those of piston engines, experts report

Miniturbines Becoming Work Horses

• GAS TURBINES no bigger than your desk may well play an important role in the future of metalworking plants.

The reasons: They make ideal power sources for standby or regular operation; they're easy to run and maintain; upward of half a dozen manufacturers are well on the way to a new generation of turbines which will bring operating and initial costs into line with those of more conventional power sources.

These are some of the jobs small turbines (1000 hp and less) are already performing:

• Running an air conditioner and a generator. (A unit at a Little Rock, Ark., shopping center turns a 900 kw generator—exhaust heat powers an absorption-refrigerator air conditioner.)

• Providing standby electrical power.

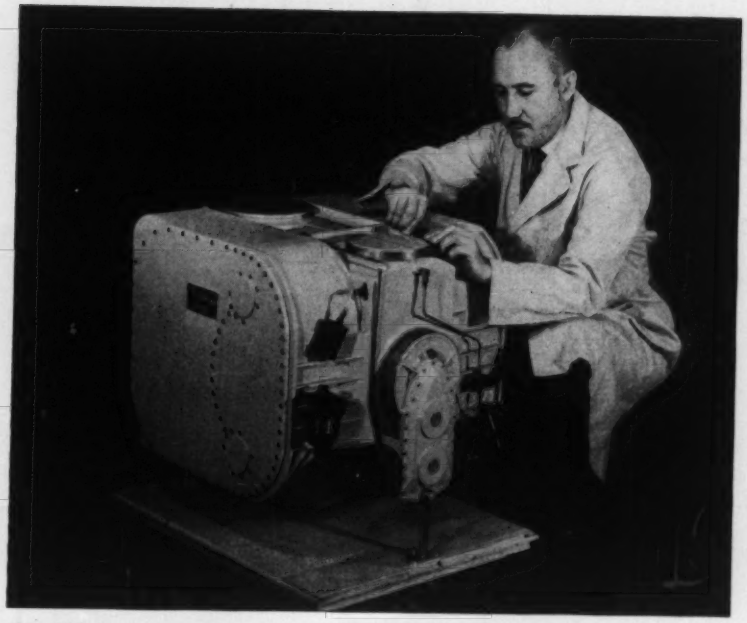
• Furnishing power for boats and their auxiliaries. (An Army fire fighting tug gets its water throwing ability from two Boeing gas turbines.)

• Pumping liquids or compressing gases.

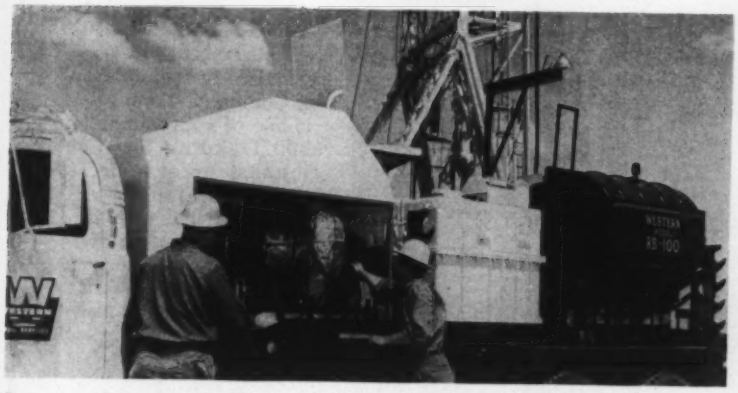
• Providing portable power.

• **Such turbines offer a variety of advantages as stationary powerplants. The high initial investment ($30 to $100 per horsepower) is offset somewhat by fairly low installation and maintenance costs.**

Unlike piston engines, gas turbines of comparable ratings are small, have few moving parts, are easily maintained. Air is sucked into a compressor, blasted into a combustion chamber where it's mixed with fuel, burned, and exhausted through a series of turbine fans. Such engines are excelled only by rockets in production of horsepower per pound of weight. Here is a rundown of other advantages:



This 600 hp gas turbine is being developed by Solar Aircraft Co., under an Army-Navy contract, as a multipurpose drive unit



Company that employes high pressure to revitalize oil wells mounts a 1000 hp turbine on truck that also holds pumps and other accessories

They can burn a variety of fuels —diesel oil, gasoline, kerosine, or natural gas. Such turbines weigh as little as one-tenth as much as a conventional engine of the same rating, and occupy perhaps one-seventh as much space. They can develop more than 1 hp for every 0.7 lb of weight.

Vibrationless, they don't need heavy foundations.

Some units can be maintained with an Allen wrench, a screw driver, and pliers.

The engines can be installed in remote areas for unattended or automatic operation.

Because turbines have few moving parts, they can be left idle for long periods, started, and brought to top speed almost at once.

• Recent advances in design promise immediate benefits—reasonable fuel costs, longer operation between overhauls, cheaper initial costs.

A leading designer of small turbines is Sam Williams, president, Williams Research Corp., Walled Lake, Mich., which makes a 75 hp turbine that weighs only 23 lb. It is said to cost 10 to 15 per cent less than similar turbines and to be somewhat more efficient. A unique feature: Cast blades are welded to a forged hub. ("That's the way we'll make them in the future," he claims.) Maintenance overhauls take less than 3 hours. (Most units operate 10,000 to 20,000 hours between overhauls.)

Mr. Williams believes his customers for small turbines will continue to be makers of boats, military vehicles, and small aircraft, but he's equally sure that stationary engine power is a sizable upcoming market.

Solar Aircraft Co., San Diego, Calif., a subsidiary of International Harvester Co., describes a few typical stationary applications it has made:

- Western Co., Ft. Worth, Tex., employs a turbine to drive an oil formation fracturing pump—both are mounted on a regular commercial truck. (The pump revitalizes old oil wells.)
- Another Solar unit burns natural gas, runs an 800 kw electric generator. Exhaust heat is channeled through a boiler which furnishes steam for other manufacturing processes (a 1000 hp turbine of the same type puts out well over 12 million Btu per hour).
- The merchant ship *Pioneer Moor* has a gas turbine to provide electricity and steam when the ship's boilers are shut down in port.

• Turbinemakers say advanced designs are already on the way and will probably reach the market in less than two years. Military impetus is partly responsible.

Among others, Solar is developing a 600 hp turbine under an Army-Navy contract for across-the-board applications—stationary, marine, and vehicular.

It states that fuel consumption of its version will be 0.4 lb per horsepower per hour.

AiResearch Mfg. Co. of Arizona, Phoenix, Ariz., a division of Garrett Corp., is one of the leading small turbinemakers. It predicts these goals will be achieved by 1963: Purchase costs will be reduced to $20 to $25 per horsepower; specific fuel consumption will drop to at least 0.4 lb per hour per horsepower. Total market in the next five years, says AiResearch, will probably be double the number of units it has already made (estimated at 15,000 units).

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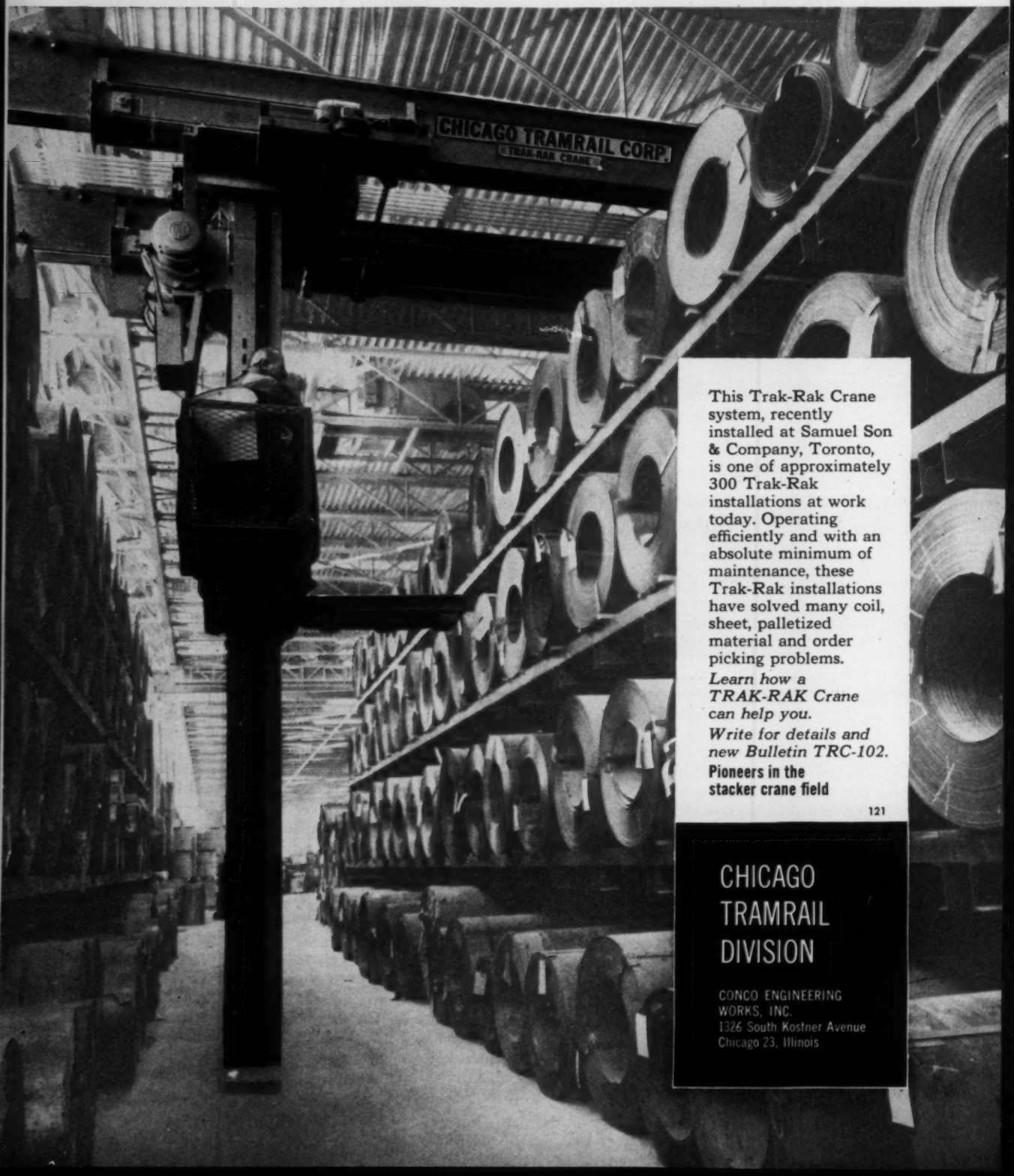


This Trak-Rak Crane system, recently installed at Samuel Son & Company, Toronto, is one of approximately 300 Trak-Rak installations at work today. Operating efficiently and with an absolute minimum of maintenance, these Trak-Rak installations have solved many coil, sheet, palletized material and order picking problems.

Learn how a TRAK-RAK Crane can help you.

Write for details and new Bulletin TRC-102.

Pioneers in the stacker crane field

121

CHICAGO TRAMRAIL DIVISION

CONCO ENGINEERING WORKS, INC.
1326 South Kostner Avenue
Chicago 23, Illinois

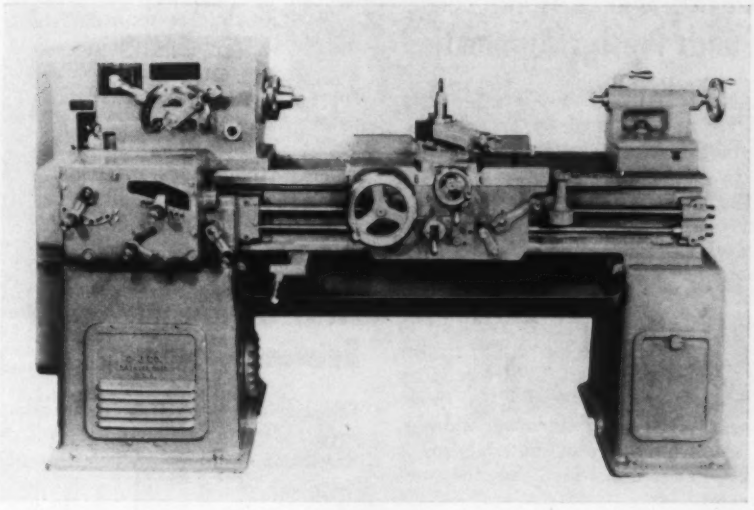
Friction Clutch, Brake Control Lathe Spindle

A SPECIAL, Twin-Disc, friction clutch and brake provide spindle control without stopping or starting the motor on the Carroll-Jamieson lathes.

The company says heavy headstock gearing provides maximum power at the spindle, enabling the medium duty lathe (16 and 18 in. models) to do rugged turning.

The control handle for clutch and brake assembly is at the front of the lathe. Two shifter handles provide a quick, convenient method of spindle speed change. Twelve geared spindle speeds from 20 to 900 rpm are available. The motor has 5 hp.

For further information, *write* Dept. 14, Carroll-Jamieson Machine Tool Co., Batavia, Ohio.

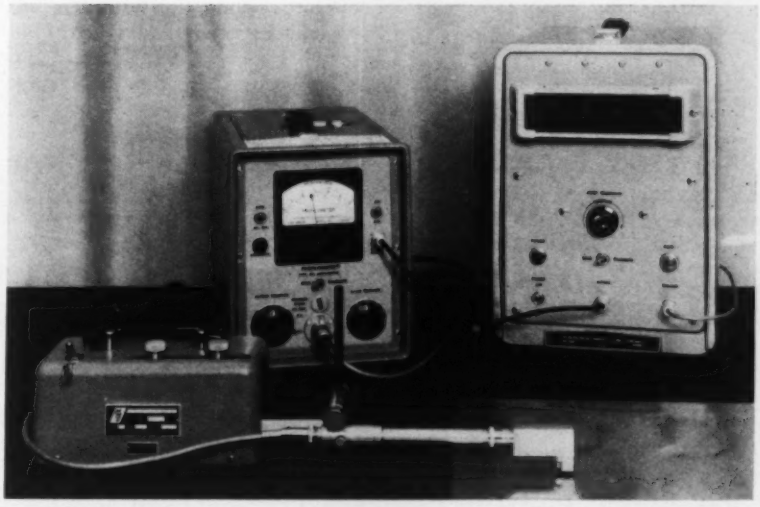


Instruments Check Surface Finish Two Ways

THE APPEARANCE and bonding properties of decorative coatings can be controlled by an instrument that checks surface irregularity peaks and average roughness height on products prior to plating or painting.

Typical application: Surface finish control on bright metal parts such as bumpers where luster and shine are buying influences. In addition, a correlation exists between peaks on the finished surface and the bonding of paint and other organic materials.

The unit can be set to read only the average roughness height or to make average roughness height and peak counts simultaneously. The manufacturer cites one reason for combining both measurements in one production machine: Tests show that machined and ground surfaces having the same or similar average roughness height readings may have a wide variation in the number of peaks producing the average reading.



Components include an MA tracer, a BK link arm, a V-S Mototrace, a QC-S amplimeter, and a PE electronic frequency counter. The counter is a high speed unit that provides visual, three digit readout and has a self-contained, operator controlled, standardizing cir-

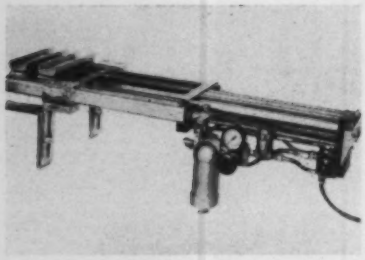
cuit. The company says the unit is portable and easy to operate.

For further information, *write* Micrometrical Mfg. Co., a subsidiary of Bendix Corp., 3621 S. State Rd., Ann Arbor, Mich.

Device Makes Hand Fed Punch Presses Automatic

AN AIR OPERATED coil and strip feed unit designed by Power Control Products is suitable for use on any hand fed punch press. It's portable. The manufacturer says it can profitably convert punch press, press brake, and square shear jobs to high speed, automatic feed, even on short run work.

The unit will feed strokes up to 12 in. with speeds up to 350 strokes per minute in stock widths to 24 in. in light gage material (stock thickness to 11 gage in narrower widths). It will handle most materials up to 2½ lb per lineal foot, says the company.



The unit is versatile: It can be readily transferred from one machine to another. It can be mounted to feed stock from right to left, left to right, or front to back, and can be set up as a pull or push feeder.

Stroke adjustment can be controlled to ±0.002 in.

For further information, *write* Power Control Products Inc., Vicksburg, Mich.

Tool Setting Gage Easy to Operate

A TOOL setting gage (Tool-Tronic) is a combination optical and electronic device for establishing tool point location within 0.000025 in. in relation to the workpiece. The manufacturer says it's fast and easy to use and does not require special skill beyond requirements to run the basic machine on which it is used.

The compact, portable package consists of two basic units. The Tool-Tronic gage has a gage sensing head mounted vertically over the tool position which houses the light source lenses and photosensing cells. The unit is connected electrically to a reading cabinet housing an electronic amplifier power supply and two tool location indicating meters.

For further information, *write* Heald Machine Co., a subsidiary of Cincinnati Milling Machine Co., 10 New Bond St., Worcester 6, Mass.

Filter Gives Long Service Between Cleanings

DESIGNED with a large filtration area, a strainer-filter unit for hydraulic equipment provides the advantages of long service between cleanings and low equipment downtime. Models are available with capacities from 5 to 10 gpm, 10 to 20 gpm, and 20 to 30 gpm.

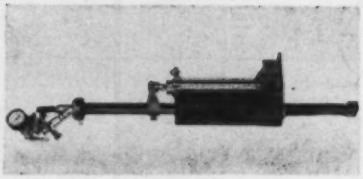
The wire mesh is Monel and the other parts are made of cadmium-plated steel. Special sizes and alloys are available. The filters are available in standard 100 mesh (140 microns) and 60, 80, 150, and 200 mesh for filtering particles from 260 to 75 microns.

For further information, *write* Michigan Wire Cloth Co., 2100 Howard St., Detroit 16, Mich.

Hot Air Cure Attachment Improves Shell Cores

STRONG, LIGHT, and thin shell cores are easily produced with Shalco's internal hot air cure attachment, says the maker. It adds: When used with a Shalco core blower, the attachment provides a significant boost in production speed with a gain of 25 per cent in output and a reduction of 30 per cent in the amount of resin sand used.

The attachment seals the interior surface and prevents peelback



and will help to retain a constant temperature in thin sections of the corebox even under continuous production.

Designed for Shalco core blower Models U-180, U-180-M, and U-360, the internal cure unit is said to be simple to install. It's timed into the automatic cycle. It's recommended for shell cores with blow openings of 2 in. or greater, and provides controlled temperatures to 800° F.

For further information, *write* Shalco Div., National Acme Co., 170 E. 131st St., Cleveland 8, Ohio.

Unit Prepares Tapes for Drilling Circuit Boards

AN INDEPENDENT programer developed by Edlund prepares conventional 1 in. 8 channel tapes for drilling printed circuit boards directly from artwork. The manufacturer says the high speed, highly accurate programer can be used with any conventional, tape controlled, printed circuit driller.

The machine enables an operator to work quickly and accurately to locating up to 30 positions per minute directly from the artwork. Because the programer is independent of the drilling equipment, it can be used for preparing tapes when the drilling machine is being used.

For further information, *write* Dept. P, Edlund Machinery Co., Cortland, N. Y.

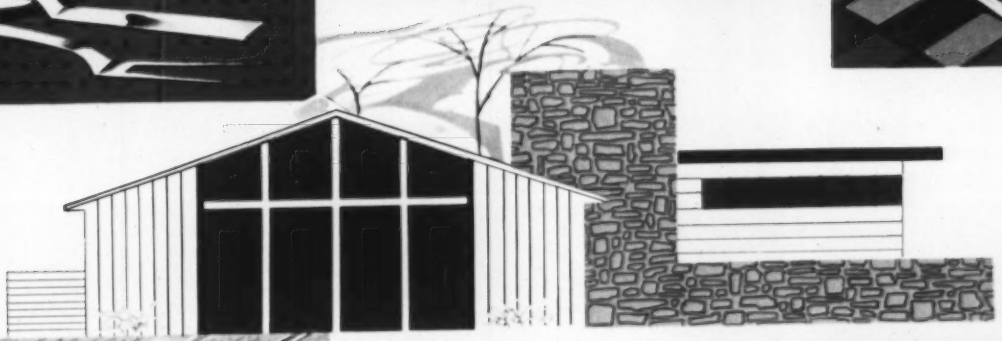
Swivel Table Washer Loads From Sides or Front

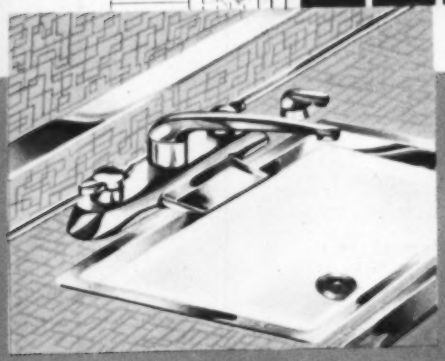
A SWIVEL table washer developed by Waukee can charge or discharge work from either side at a 90 degree angle as well as to the front of the loading table in the normal manner. A locking device prevents accidental table movements.

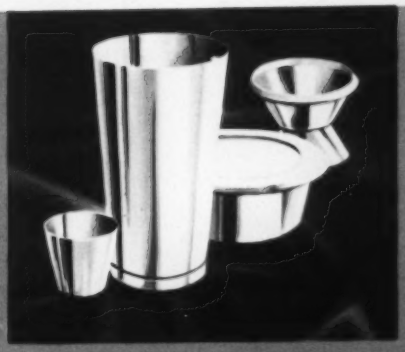
Single or double end units are available. Four standard models

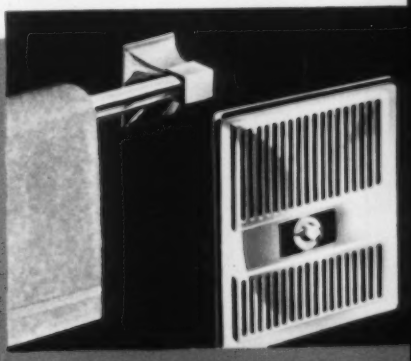
Fine to have around the house

for every stainless reason!









Superior

STAINLESS STRIP STEEL

At every turn, stainless serves in the modern home . . . brightens the decor, lightens every cleaning chore! From Superior Stainless Strip Steel, precise in specification for each specified need, are made scores of tarnish-proof, wear-resisting, care-banishing home products. ● Let us discuss our steels and your fabrication possibilities, without obligation of any kind.

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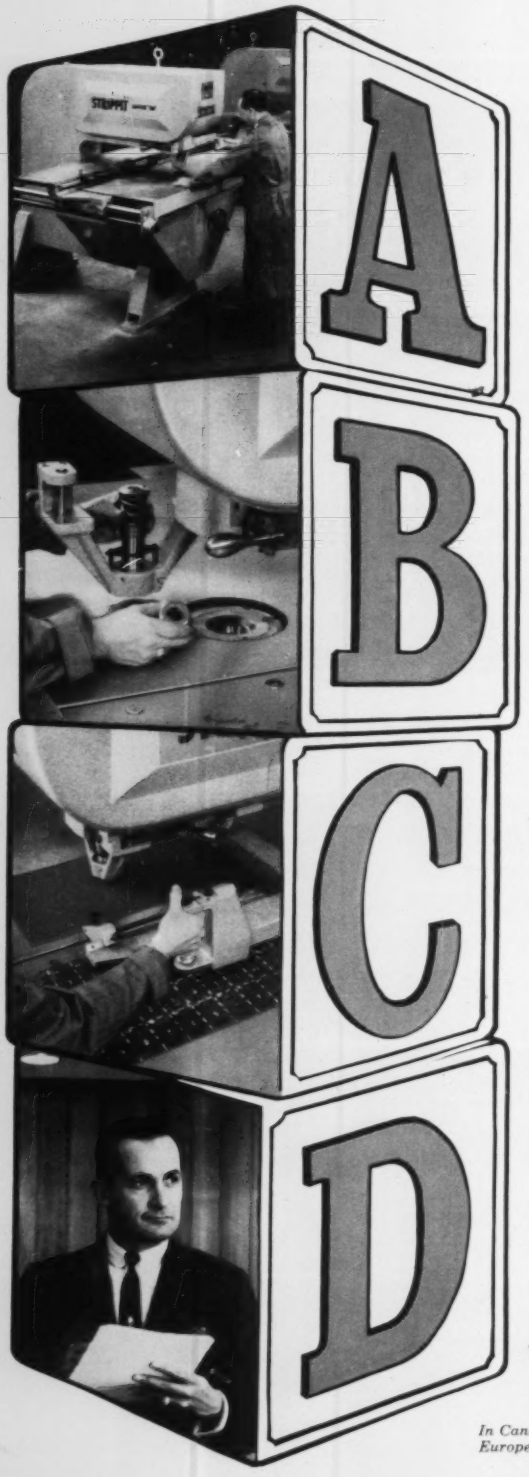

A versatile, multi-purpose, single station sheet metalworking machine, the STRIPPIT Super 30 Fabricator punches round and shaped holes in workpieces up to 60″ wide...any length. Will also punch close-centered hole clusters in any material up to ¼″ thick... nibbles straight or contour lines in ⅛″ material...notches 90° corners, radii and special edge notches to meet most production requirements in material up to ⅛″ thick.

Big savings in time are standard! Change tools in *seconds!* STRIPPIT's Swing-Shift Punch Holders permit you to change punches from either right or left. One size punch and die can be substituted for another in 20 seconds. Workpieces can be positioned rapidly for precise hole location thanks to STRIPPIT'S Micrometric Back and End Gaging System. Set dimensions directly to thousandths.

Convert the STRIPPIT Super 30 Fabricator to an efficient medium run production unit simply by adding our Duplicator attachment. Another useful accessory is our Dupl-O-Scope, a high quality optical instrument designed specifically for translating blueprints, drawings, negatives, layouts or sample parts into accurate templates or "one-of-a-kind" finished pieces.

Don't hesitate to call your STRIPPIT Tool & Methods Engineer. He can arrange a demonstration at your plant that will show you ways to cut costs with the STRIPPIT Super 30 Fabricator or other STRIPPIT machines and systems. Write for Catalog 30S.

WALES **STRIPPIT** INC.

HOUDAILLE INDUSTRIES, INC.

210 Buell Road **Akron, New York**

In Canada: Strippit Tool & Machine Company, Brampton, Ontario; In Continental Europe: Raskin, S. A., Lausanne, Switzerland; In the British Isles: Kearney & Trecker—C.V.A. Ltd., Hove, Sussex England.

match furnace sizes. Other features include spray nozzles above and below the work, minimum 240 gpm circulation, automatic wash cycle timer (which shuts off the pump when washing is completed) and a choice of gas, steam, or electric heating. The unit is piped and wired at the factory.

For further information, *write* Waukee Engineering Co. Inc., 5150 N. 35th St., Milwaukee 9, Wis.

Tool Post Grinder Has Air Motor Enclosed in Quill

COMPLETE visibility and accessibility are among the advantages of a tool post grinder which is operated by a 1 hp air motor completely enclosed in the quill. The grinder uses the same quill for internal or external grinding operations.

The motor (18,000 rpm top speed) operates through 4 to 1 reduction gears to produce a maximum spindle speed of 4500 rpm. Grinding speed can be changed by adjusting the air supply valve. Motor and quill assembly is only 1⅞ in. in diameter.

The quill assembly is mounted on the lathe compound by a support block and eccentric. One bolt locks the eccentric and holds the assembly. The eccentric provides a ⅞ in. vertical adjustment of the quill.

For further information, *write* Gilmore Industrial Grinders Inc., 6523 Eppes St., Houston 17, Tex.

Drill Points, Cam Relief Grinding Done by Unit

A FLOOR model relief grinding machine developed by Harig performs as an ultraprecise, drill point grinder and as a versatile, cam relief grinder.

Drill point grinder: The machine grinds original points and resharpens styles such as split crankshaft points, Helixpoints or spiral points, chisel or conventional, sheet metal, three and four lip core drills, missile points for exotic metals, printed circuit points, and other specials. Indexing and concentricity accuracies are in tenths. Changeovers to different sizes, angles, and styles can be done in seconds. Web thinning and split points are done on a slide independent of and adjacent to a second grinding wheel. The machine is intended for users of mixed tooling or for continuous production.

Cam relief grinding: The versatile unit grinds rapidly with eccentric relief tools such as step drills with or without marginal relief, taps, countersinks, uniflutes, center drills, double margin drills, subland drills, porting and valve seating tools, and special tools with forms and contours.

Work range: From 1/64 in. through 1-1/32 in., lefthand or righthand. The company says there is no limit to flute numbers. A set of 66 precision collets designed for gripping on flutes comes with the machine. An additional headstock (optional) converts the unit to an end mill and milling cutter sharpener.

For further information, *write* Harig Mfg. Corp., 5757 W. Howard St., Chicago 48, Ill.

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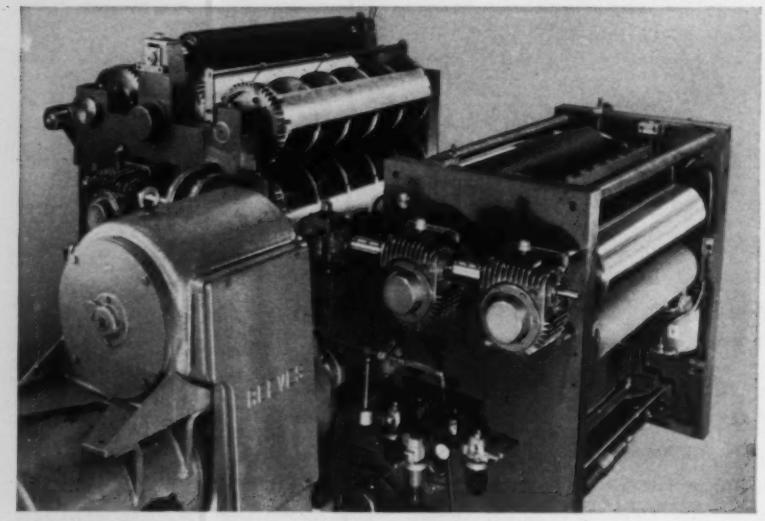

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Splicing a new roll onto an expiring ribbon of paper while it's moving 300-ft. per minute requires precise timing and accurate synchronization. This automatic butt splicer uses three Cone-Drive **double-enveloping worm** gear hollow shaft speed reducers to transmit the vitally important synchronized drive speed instantaneously and smoothly. The fact that these are standard, not special, reducers testifies to the high degree of accuracy built into every Cone-Drive unit.

Accurate Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

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DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

NEW Literature

Write directly to the company for a copy

Welding Handbook

Information about many types of low alloy, high tensile steels is presented in a 64 page reference book. It includes chemical analyses and physical properties as provided by producers. Electrode recommendations are given for welding each of the steels as well as for hundreds of steels produced at ASTM specifications. Alloy Rods Co., P. O. Box 1828, York, Pa.

Innershield Welding

Vapor shielded arcwelding is discussed in a bulletin. Typical process applications are presented. Lincoln Electric Co., 22801 St. Clair Ave., Cleveland 17, Ohio.

Applications for LP-Gas

LP-gas applications are discussed in a 20 page booklet. Covered are such things as engines, heating, cooling, food dehydrating, paint and plaster drying, annealing, kiln drying, and portable floodlighting. National LP-Gas Council, 1515 Chicago Ave., Evanston, Ill.

Beryllium Bolts

The development of beryllium structural bolting is discussed in a compact reference pamphlet. Physical characteristics of beryllium are reviewed. Specify Form 2719, 1,910 *Years of Beryllium*. Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

Steel-Bonded Carbides

An article reprinted from the General Session of Powder Metallurgy discusses the properties of steel-bonded titanium carbide. Machinability and heat treatment of steel-bonded materials are discussed and mention is made of certain tooling applications. Sintercast Div., Chromalloy Corp., 171 Western Highway, West Nyack, N. Y.

Aluminum Forgings

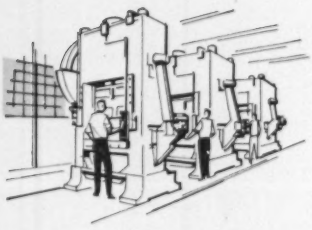
How aluminum forgings are made, strength of aluminum forgings, and some of the most common problems in forging aluminum are discussed in a brochure. Dept. PRD-56, Reynolds Metals Co., Richmond, Va.

Make-Up Air Systems

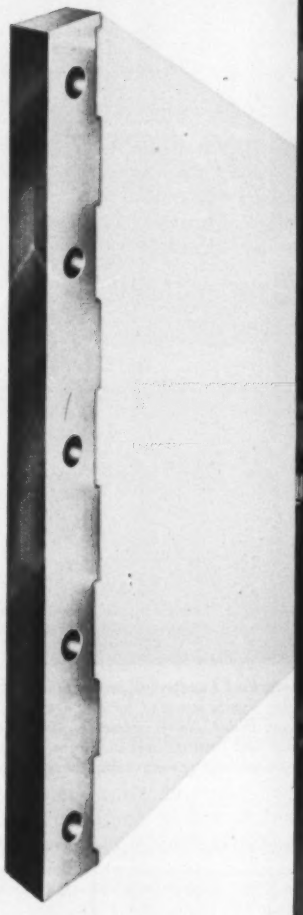
A handbook presents an analysis of make-up air systems and the basic design steps to follow. Ask for Heating Handbook DF-200, *Design Considerations for Make Up Air Systems*. Reznor Mfg. Co., Mercer, Pa.

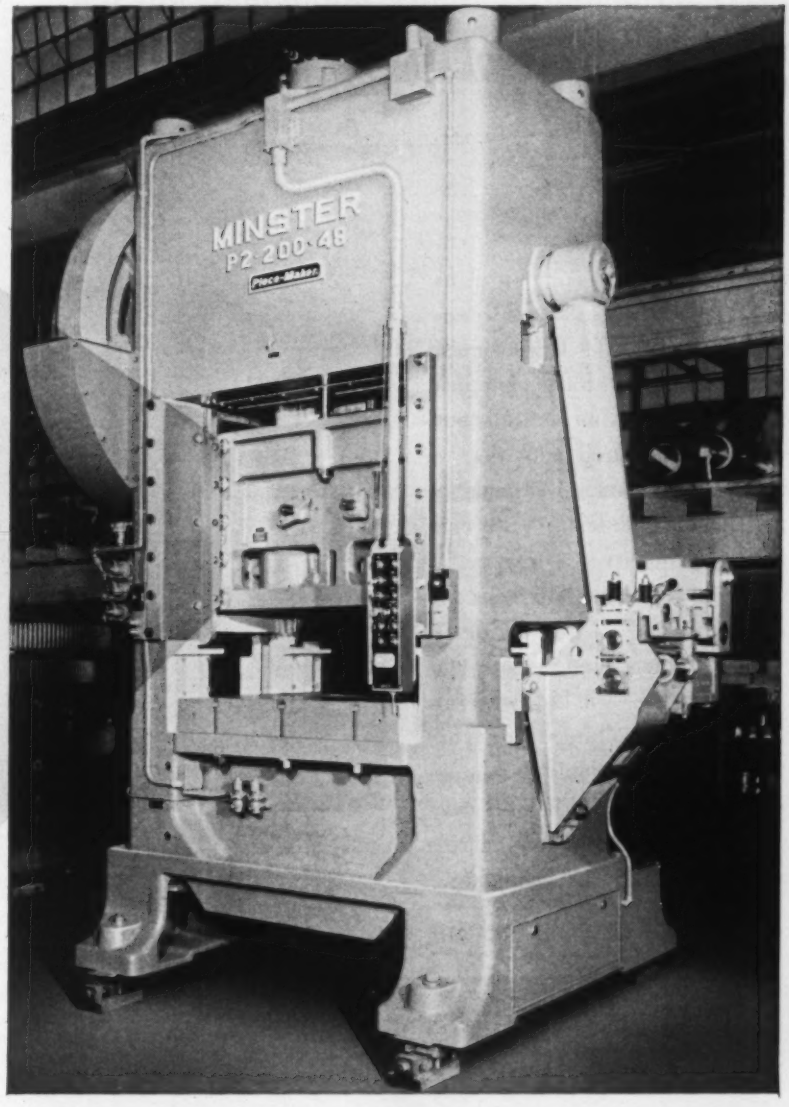
Heating Furnace Controls

Automatic control for open hearth furnaces, glass tanks, reheating and annealing furnaces, and soaking pits are discussed in a 24 page presentation (Folio 122). Both hydraulic and electrohydraulic systems are described. GPE Controls Inc., 240 E. Ontario St., Chicago 11, Ill.



ANOTHER SATISFIED USER





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Lamina-Bronze Wear Plates and their use are more completely described in Bulletin WP-59, send for your free copy.

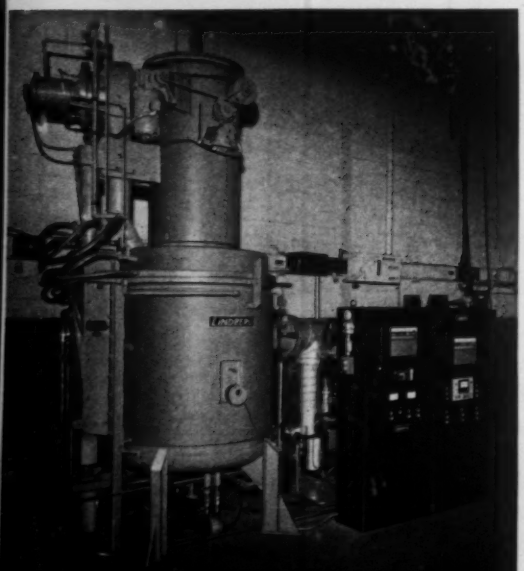
The adjustable slide ways of this Minster press utilize Lamina-Bronze (electroplated bronze on steel) Wear Plates to assure long-life and free-running. In like manner, Lamina-Bronze wear surfaces are the best answer for any part that requires the non-seizing properties of bronze and the strength of steel.

J. WALTER REX tells why he chose Lindberg equipment for his new Florida plant

QUOTE from Mr. Rex

"When we designed our new plant, Rex of Florida, Inc., we made sure we could provide the Florida metal working industry with complete heat treating services. After carefully surveying the industrial activities we would serve we knew we would be called upon to offer scientifically controlled, high quality heat treating for a variety of metals, both ferrous and non-ferrous, and an unusual diversity of sizes, shapes and weights. Our long experience with Lindberg furnaces and atmosphere controls assured us that we could depend on Lindberg equipment to help us meet most efficiently the widely varying demands of our Florida customers."

J. Walter Rex, President, Rex of Florida, Inc., Fort Lauderdale, with Lindberg high temperature, all-purpose furnace, one of six Lindberg units specified for this new plant. Mr. Rex, also President, J. W. Rex Company, Lansdale, Penna., is recognized as one of the foremost metal working authorities and his commercial heat treating operations are among the largest and most important in the country, particularly in treating components for rockets and missiles.



Latest Rex purchase from Lindberg—new vacuum furnace for Lansdale, Penna., plant

Mr. Rex's confidence in the ability of Lindberg equipment to meet the most exacting commercial heat treating requirements is based on the years of efficient and dependable service rendered by Lindberg units in his commercial heat treating operations. He has been a Lindberg customer for nearly 20 years. We're glad that he has found our equipment so satisfactory. We're very well satisfied with Mr. Rex as a customer, too. Altogether, including the units for Rex of Florida, Inc., he has purchased 34 Lindberg units over the years.

Lindberg offers the most complete line of fuel-fired and electric furnaces and equipment for heat treating ferrous and non-ferrous metals available to industry. If you have any problem in heat treating, get your local Lindberg representative's help now. You can depend on his experience and Lindberg's engineering and design know-how to provide exactly the right equipment for your need. And it's easy, too! Just call your Lindberg Field Engineer (he's listed in your classified phone book) or write us direct. Heat Treating Furnace Division, Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, Spain, Switzerland and West Germany.

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August Output Tops Forecast

MARKET ANALYSTS are making upward revisions in their estimates of steel production for August and the third quarter.

A few weeks ago, they figured that August's output would be only slightly higher than July's 8.1 million ingot tons and that third quarter production would no more than equal the second quarter's output. Now they're looking for the August total to be 5 per cent above July's and equal to the 8.5 million ingot tons poured in June.

STEEL predicts that production in the week ending Aug. 26 will be up for the fourth straight week. Ingot output will slightly exceed the estimated 1,925,000 tons that the industry poured in the week ended Aug. 19. Output then was 0.8 per cent higher than the previous week's.

MILLS BUILD INVENTORY—The uptrend reflects stronger demand from appliance makers, the construction industry (including pipelines), and small users who are starting to consume steel at a faster rate. But in addition, it suggests that steelmakers are stockpiling semifinished material for quick processing in September. Reason: They're looking for an avalanche of orders from automakers after the new labor contracts are signed. The car companies have enough steel on hand to start production of their new models—some probably have enough metal to last them through September—but they're going to need more in a hurry if they're to sustain a production rate of 500,000 to 600,000 cars a month.

USERS AREN'T HEDGING—Despite the possibility of higher steel prices in October, when industry wage rates will go up another 7 to 10 cents an hour, consumers aren't hedging. Their inventories are believed to be about 12 million tons, slightly less than at the start of the year. Some buyers may hedge moderately in September, but no inventory buildup of consequence is likely until the fourth quarter.

FAST DELIVERIES—Users have little incentive to build inventories now because they can still get fast service from mills and service centers on most products. In Pittsburgh, delivery promises on hot rolled bars are "prompt" at 10 to 14 days, but producers figure they'll be quoting four to six weeks in November. In the East, sheet and sheared plate deliveries are stiffening.

DISTRIBUTOR CUTS PRICES—In Chicago, a steel service center is meeting competitors' "preferential" price concessions on stainless sheets by offering its customers a new "cost reduction program." By ordering 10,000 lb or more of stainless sheets, or coils (of one type, gage, and width) for shipment at one time and by paying the invoice within ten days, users will get the 10,000 lb base price, less an 8 per cent discount. The service center will make only 2 per cent on the sale, since it buys at the mill price less 10 per cent.

SENATORS STUDY PRICES—As steel industry leaders weigh prospects for price adjustments that might offset the higher employment costs that go into effect on Oct. 1, Democratic liberals in the Senate are looking for evidence that the industry can absorb the higher costs and still operate profitably. A group headed by Sen. Albert Gore (D., Tenn.) was briefed recently by a Harvard economist who presented a statistical case against a price hike. Although Sen. Estes Kefauver (D., Tenn.) did not attend the meeting, it's understood that his subcommittee will be urged to begin a critical study of the steel industry's pricing practices.

WHERE TO FIND MARKETS & PRICES

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Wrought Alloys	112	...

*Current prices were published in the Aug. 14 issue and will appear in subsequent issues.

One of the advantages of plastic coated steel pipe is that field joints are easy to make. The yellow coating on Republic Steel's X-Tru-Coat is cut back only 4 to 6 in. vs. 1 ft when other types of wrapping are used. The joint is then protected by wrapping it with pressure sensitive plastic tape

Plastic Coated Pipe Shows Strong Growth Potential

STEEL AND PLASTIC have been joined to fight one of the oldest foes of the pipeline industry—corrosion. Result: Plastic coated pipe combining the strength of steel with the corrosion resistance of polyethylene.

The product was first produced in a commercially acceptable form only three years ago by Republic Steel Corp., Cleveland. Today, it is one of the hottest items the company makes, and other steelmakers are becoming interested.

• **What It Is**—Republic calls its product X-Tru-Coat. It is ordinary pipe or tubing which is first put through a caustic dip to remove oil and grease. Scale, oxide, or other foreign matter is removed through shotblasting before a special, black, elastic adhesive is applied. Finally, a coating of polyethylene plastic is extruded over the undercoating. As it cools, the plastic shrinks over the pipe, effecting a bond that prevents underfilm migration of moisture at the ends of the coating.

The undercoating remains "live" regardless of weather conditions. If the outer coating is damaged, it will flow over the exposed part and insure the protection of the steel pipe. And the plastic remains flexible in all kinds of weather, permitting the tube to be bent without failure of the coating. Users report the plastic is so tough that the pipe can be jackhammered through unbroken ground without damage to the skin.

• **Where It Is Used**—The biggest use so far is in transmission lines for oil, gas, and water. Howard McDaniel, assistant manager of sales for Republic's Pipe Sales Div., says that perhaps 85 per cent of all pipe installed by utilities is coated in some way. (The most common method is coal tar and paper.) "This market has hardly been scratched," he declares. But the market will grow as the size range of the pipe grows—it is available in ½ to 8⅝ in. OD.

The industrial market is one of the most promising. Wherever there is corrosive atmosphere, there is a need for such a product.

• **Why It Is Used**—At least seven major cost advantages of plastic coated pipe are reported by users:

1. Installation costs are lower. (There's no need for field wrapping.) 2. It requires less maintenance. 3. It requires less cathodic protection. 4. It sustains less damage in handling. 5. Storage problems are reduced. 6. Field joints can be made quicker. 7. It is lighter (the coating weighs only one-fifth that of conventional wraps) which cuts shipping and handling costs.

Even the yellow color of Republic's pipe is functional. It reflects sunrays, making the pipe as much as 45° F cooler than tar coated pipe on hot days. Visual inspection is made easier—for example, cuts and bruises are easy to spot. And the pipe is easier to spot during excavation.

• **How Much Is Used**—Republic says that even during the 1960 recession, when steel demand in general was declining, demand for plastic coated pipe bucked the trend. In only three years, 45 million ft have been sold—almost half of that last year. The growth rate should increase, officials state. The sales total since 1958 has reached almost $19 million.

At Republic's annual meeting this year, Thomas F. Patton, president, reported that the next step will be to market steel tubing with a plastic inner lining.

• **Another Is Interested**—Jones & Laughlin Steel Corp. is expected to be in the market shortly. STEEL has learned that new facilities are being installed at the Aliquippa, Pa., plant to produce a plastic coated gas transmission pipe using the Whirlclad coating system of Polymer Corp. In that process, a dry vinyl powder is fused directly onto the outer side of the pipe in a closely controlled thickness. J&L reportedly will color it light green for easy identification.

Metal Needs of Gas Industry Forecast

METAL NEEDS of the nation's gas industry through 1964 have been estimated by the American Gas Association, New York.

The tonnage required annually (see table) will be a little less than what was used in 1960, but dollar expenditures this year and next are expected to break the record.

• **A Change in Needs**—Emphasis will switch from transmission lines to distribution lines. That will lower demand for steel pipe 6 in. in diameter and over and increase it for sizes under 6 in. A network of transmission lines carries natural gas from production sources to distribution systems, which supply 33.6 million consumers.

A materials consumption survey conducted biennially by AGA shows that 2.2 million tons of steel were used last year by gas utilities and pipeline companies. That topped the 1958 figure by 230,000 tons. In 1960, the gas industry also used 35,000 tons of cast iron, 1125 tons of copper, and 34 tons of aluminum.

• **Another Record**—Expenditures of the gas industry this year (see table) are expected to total $1.932 billion, exceeding the record of $1.845 billion in 1960. Another record is foreseen for 1962—$2.121 billion.

• **Major Projects** — Among major construction jobs in 1961 is the $133 million project of Pacific Gas Transmission Co., which will carry natural gas 614 miles from the Idaho-British Columbia border to the Pacific Gas & Electric Co. system in California.

Work is also planned this year by El Paso Natural Gas Co. on a $59 million system to increase service to Southern California Gas Co. and Southern Counties Gas Co. of California. Michigan - Wisconsin Pipe Line Co. undertook a $45 million project to expand its service. Another large project: Expansion of facilities in the Chicago area by Natural Gas Pipeline Co. of America. Cost: $43 million.

Metal Needs of Gas Utility, Pipeline Industry

1960-64

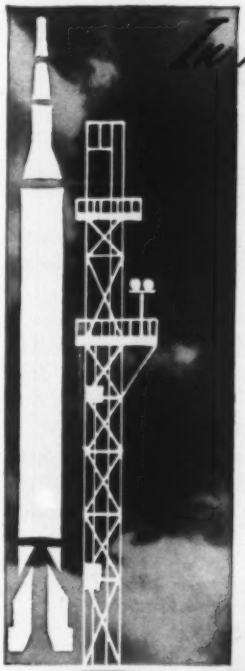
	Actual 1960	Forecast 1961	1962	1963	1964
	THOUSANDS OF NET TONS				
Steel, Totals	2,238	2,165	1,887	2,090	2,037
Pipe Totals	2,227	2,157	1,881	2,077	2,023
Pipe under 6 in.	339	381	360	437	505
Pipe 6 in. to 14 in.	434	394	386	385	448
Pipe 16 in. and over	1,454	1,382	1,135	1,255	1,070
Other Steel	11	8	6	13	14
Cast Iron	35	37	41	51	58
	NET TONS				
Copper	1,125	1,146	1,404	1,675	1,878
Aluminum	34	37	40	52	56

Gas Utility, Pipeline Construction, Expenditures by Type of Facility

1960-64 (Millions)

Type of Facility	Actual 1960	1961	1962	1963	1964	Forecast 1961-64
Industry Total	$1,845	$1,932	$2,121	$2,096	$2,062	$8,211
Production and Storage	157	268	354	410	402	1,434
Transmission	848	732	605	672	570	2,579
Underground Storage	59	87	126	78	112	403
Distribution	696	735	909	830	873	3,347
General	85	110	127	106	105	448

Source: American Gas Association.



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Inconel X	(3)	AM 350	
Incoloy	(3)	AM 355	
Monel	(3)	19-9 DX	
Hastelloy C	(4)	19-9 DL	
Hastelloy X	(4)	A286	
L605 (Haynes #25)	(4)	Rene 41	(2)
Carpenter 20	(5)	"A" Nickel (electronic grade)	

(1) Reg. U.S. Pat. Off. Armco Steel Corp.
(2) Reg. Trade Mark of General Electric Co.
(3) Reg. Trade Mark of Int. Nickel Co.
(4) Reg. Trade Mark of Union Carbide and Carbon Corp.
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COST OF POSSESSION . . . *to determine your own cost of possession for steel in inventory, consider all these factors:*

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Sheets, Strip . . .

Sheet & Strip Prices, Pages 94 & 95

Rising order volume for finished steel products is stimulating hopes among the sheetmakers that the heralded upswing in business is underway. Generally, the pickup so far is not enough to get excited about. The pattern of ordering is holding pretty much across the board, and there's no indication that any single consuming field is sparking a real upturn.

Automotive buying continues pretty much at a standstill, but the mills are confident September will witness a strong revival in ordering, barring a strike.

Little, if any, hedge buying against a possible price increase this fall is noted. However, some inventory building seems likely to start soon. Demand for galvanized sheets continues strong, and will hold up well into the fourth quarter.

Mill delivery promises on cold rolled sheets are nearer four to five weeks than recently, although better can be done in some cases. Hot rolled sheets are available in about three weeks vs. two to three weeks recently. Shipments on continuous galvanized sheets run into late October in several instances. Specialties, such as electrical sheets and enameling stock, are hard to get under 30 days.

Wire . . .

Wire Prices, Pages 95 & 96

Moderately heavier buying of wire on automotive account is reported by a few sellers. But the bulk of spring and other wire products required for initial auto assemblies has not been scheduled for production. High carbon specialties for industrial use are moving a little more actively, with most makers operating at 60 to 65 per cent of capacity.

Demand for prestressed strand and other grades of wire used in reinforcing (notably welded wire fabric) is sustained, but it is well under producing capacity.

American Steel & Wire Div., U. S. Steel Corp., Cleveland, has booked an order for 55,000 spools of barbed wire, galvanized, from the U. S. Engineer, Chicago, at $414,442. The Military Industrial Supply Agency, Navy, Philadelphia, is tak-

ing bids on 65,000 spools of stainless steel wire, grade 316.

Seaway Steel Div., North Tonawanda, N. Y., Roblin-Seaway Industries Inc., has doubled its annealing capacity with the acquisition of new furnaces for normalizing and spheroidizing cold heading quality wire rod in coils.

Tool Steel . . .

Tool Steel Prices, Page 99

Shipments of tool steels (excluding hollow drill steel) in June totaled 6912 net tons, reports the American Iron & Steel Institute. That compares with 6305 tons in May and with 7332 tons in June, 1960.

In the first six months of this year, 38,774 tons were moved vs. 53,249 in the same period last year.

More Price Concessions Made on Stainless Sheets

Continued weakness in the stainless steel market is reflected in further price reductions in the Chicago area. Last week, the Chicago Steel Service Co. announced a new price policy that results in additional reductions on sheets and coils. Two purchase plans are specified.

The new discounts, effective immediately, are in addition to price cuts of 5 and 6 per cent announced by some distributors last June. Other district steel service centers haven't taken action in line with the latest reductions, but they are studying the situation.

Full participation in Chicago Steel Service Co.'s new "cost reduction" program permits the purchase of stainless sheets at the 10,000 lb base price less an additional discount of 8 per cent. The program covers both warehouse and mill orders.

One plan, covering orders of 10,000 lb or more for shipment at one time, specifies that such shipments be invoiced at the 10,000 lb base, less a discount of 5 per cent. If the invoice is paid within 30 days, the account is credited with an additional 2.5 per cent discount, and if it is paid within ten days, the cash discount of 0.5 per cent boosts the total discount to 8 per cent.

The second plan covers orders of 10,000 lb or more, with releases of

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Time-saving benefit offered by your steel service center

When you have problems of procurement, production, or steel selection, the salesman from your nearby steel service center is a good man to know. With his technical training and experience, he can help you save money, improve product, step-up production.

Because steel service centers are organized to deliver any size lot of virtually all forms and types of steel, you can try test runs and experimental tool settings quickly, economically.

Your steel service center is *customer-oriented*, in business to fill *your* needs . . . on selection, delivery, and on predelivery processing. He reduces your "cost of possession" of steel, too. Call him when you need steel or steel advice.

YOUR STEEL SERVICE CENTER

STEEL SERVICE CENTER INSTITUTE

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Steel

STEEL SERVICE CENTER INSTITUTE

2000 lb or more. All releases are to be shipped in 120 days, the period starting with the first release. Each shipment of 2000 lb or more will be invoiced at the price applying to the quantity releases, less a discount of 6.5 per cent. If the invoice is paid within 30 days, the account will be credited with an adjustment equal to having purchased the material at the 10,000 lb base price, less a discount of 7 per cent. If paid within ten days, total discount rises to 7.5 per cent.

In both plans, invoices will be for published mill prices in effect at the time of shipment, less announced discounts. The discounts do not apply to such things as shearing, paper covering, and packing.

Distributors . . .

Prices, Page 100

Steel service centers anticipate a slight pickup in business this month but no appreciable gain until after Labor Day. Sheets and light structurals are moving better than most other products.

Distributors hold substantial inventories and intend to keep well stocked to cover the expected heavier demand this fall. The industry believes that higher expenditures voted by Congress for national defense will have an effect on the market, both psychological and actual.

Stainless Steel . . .

Stainless Steel Prices, Page 99

Stainless steel producers predict their August shipments will be above July's. One firm expects an increase of 40 per cent, but another looks for only a 15 per cent rise. The outlook for September is not clear. September bookings are still meager, probably because the automakers are still holding their orders back pending settlement of labor negotiations.

Production of stainless and heat resisting steel ingots in the second quarter this year totaled 292,166 net tons, reports the American Iron & Steel Institute, exceeding the 232,379 tons produced in the first quarter, but falling substantially under the 393,597 tons produced in the second quarter of 1960.

Output in the first six months this year amounted to 524,545 net tons vs. 739,764 in the same period last year.

Crucible Steel Co. of America, Pittsburgh, is booking orders for bright annealed stainless up to 48 in. wide in thicknesses of 0.010 to 0.0625 in. to be produced on its new bright annealing line at Midland, Pa.

Soviet Steel Production Rises During First Half

While steel production in this country was off sharply in the first half compared with the year ago pace, output rose in the Soviet Union, reports the U. S. Department of Commerce. Soviet production was 38.4 million tons, up 3.1 million from the like period of 1960. U. S. output was 44.9 million tons, off nearly 16 million from the year-ago level.

The Department also reported that Japan advanced to fourth place among world steel producers, displacing the United Kingdom.

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★ It's unequivocally *guaranteed* to equal the performance of all higher priced steel abrasives!

★ It equals, or exceeds, "resistance-to-breakdown" ratings of higher priced steel abrasives!
(Checked on SAE-approved, Mattson-Cargill shot life testers.)

★ It's doing an excellent job of cleaning in foundries and descaling in steel and metalworking plants.
(Should you desire first-hand information from actual users of "SUPER-STEEL", write us for names of firms in your area.)

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U. S. production of steel is expected to increase sharply in the second half to bring the yearly total to around 100 million net tons.

Japanese production of steel rose to 14,600,000 tons, up 3 million tons from a year ago. Japan is credited with 8 per cent of world output vs. 6.1 per cent in the first half of 1960.

The Commerce Department ranks the European Coal & Steel Community as second to the U. S. in production, with the Soviets third.

Steelmaking Operations Continue to Move Upward

STEEL INGOT production is increasing in line with a modest improvement in new business and prospects for a substantial gain in September. STEEL estimates output for the week ended Aug. 19 at 1,925,000 tons, a gain of 0.8 per cent over the previous week's total.

• **Pittsburgh** — Operations held about 64 per cent of 1960 capacity during the week ended Aug. 19. Production was about 379,336 tons for the second consecutive week, the highest in two months.

U. S. Steel Corp. will resume melting at its Edgar Thomson Works, Braddock, Pa., about Aug. 27.

• **Detroit** — Output maintains a steady pace here; production for the week ended Aug. 19 is estimated at 125,000 tons, unchanged from the previous week's total. Lack of shipping releases by automakers is making mills cautious about finishing much steel, but they continue to turn out semifinished slabs and billets.

• **Chicago** — Operations rose 2 points to 71 per cent of 1960 capacity during the week ended Aug. 19. It could be the prelude to the heralded September upturn. The improved rate does not seem justified by orders in hand, but mills are inclined to strengthen their semifinished inventories.

• **Youngstown**—The steel rate advanced 1 point during the week ended Aug. 19 to 56 per cent of capacity, the highest output since mid-June. The upturn reflects increasing demand for August deliveries.

• **Buffalo**—Production here is staging a faster recovery than most observers anticipated. Operations bounced back to about 54 per cent of 1960 capacity during the week ended Aug. 19.

• **Philadelphia**—Steelmaking in the Northeast district edged slightly higher in the week ended Aug. 19. In the period ended Aug. 12, the American Iron & Steel Institute index was 107, unchanged from the previous week.

• **Cincinnati** — Operations dipped sharply in the week ended Aug. 19 as an area mill shut down two furnaces for repairs. Production is estimated at about 83,500 tons, equivalent to 72 per cent of 1960 capacity. In the previous week, 90,486 tons were melted, a rate of about 80 per cent.

• **Los Angeles** — Reflecting the erratic summer vacation pattern, the Western district operating rate slipped back three points to 75 per cent of 1960 capacity in the week ended Aug. 19.

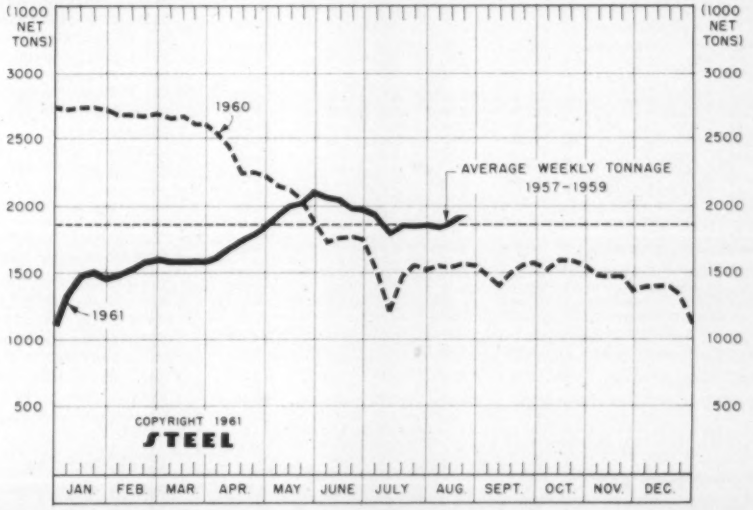
• **Birmingham** — The steelmaking rate for the Birmingham-Gadsden-Atlanta area is estimated at 66 per cent of 1960 capacity in the week ended Aug. 19. That's a drop of about one-half a point from the preceding week's rate.

STEEL INGOT PRODUCTION

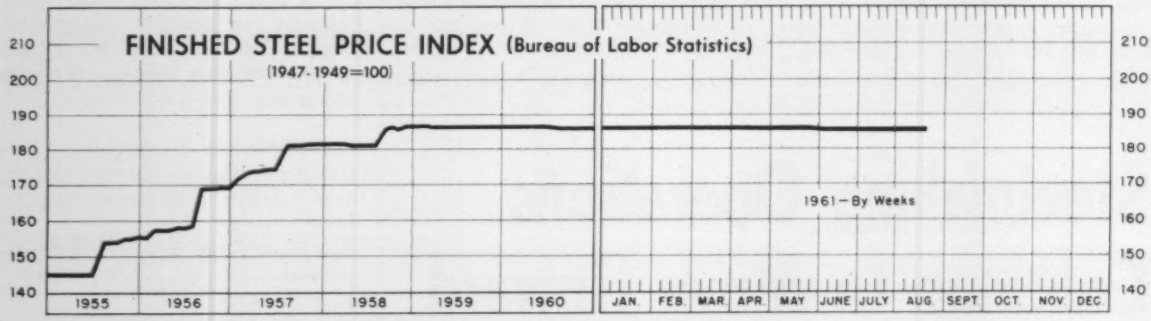
Weeks Ended	Net Tons	Change
Aug. 19	1,925,000*	+ 0.8%
Aug. 12	1,910,000	+ 3.2%
Aug. 5	1,850,000	+ 1.8%
Totals to Aug. 12		
1961	56,146,000	−18.9%
1960	69,197,000	

DISTRICTS	Week Ended —Aug. 12— Tons‡	Index†	Week Ended Aug. 5 Index†
Northeastern	285,900	107	107
Buffalo	83,725	86	77
Pittsburgh	379,336	94	90
Youngstown	159,782	94	84
Cleveland	96,299	104	102
Detroit	124,851	119	102
Chicago	392,780	105	102
Cincinnati	90,486	120	109
St. Louis	56,229	107	115
Southern	113,816	105	108
Western	126,266	108	120
Industry	1,910,000	102.5	99.3

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Aug. 15, 1961	Week Ago	Month Ago	July Index	Year Ago
185.6	185.6	185.6	185.6	186.2

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Aug. 15

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	(N.A.)
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.643
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.225
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.460
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe Line (100 ft)	195.423
		Casing, Oil Well, Carbon (100 ft)	193.028
		Casing, Oil Well, Alloy (100 ft)	302.650
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	192.285
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Aug. 16 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg = 100)	247.82	247.82	247.82	247.82	225.71
Index in cents per lb	6.713	6.713	6.713	6.713	6.114

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$137.59
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	62.63
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	62.18
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	63.41
Steelmaking Scrap, GT	38.33	38.00	37.00	32.00	50.67

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Aug. 16 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	5.075
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	5.075
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.85
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	5.00
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	5.00
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.85
Plates, Chicago	5.30	5.30	5.30	5.30	4.85
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	5.25
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.85
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275- 5.75-5.85	
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	6.30
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35-6.95
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	7.20
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	8.35
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$91.50
Wire rods, ½-⅝" Pitts.	6.40	6.40	6.40	6.40	5.80

PIG IRON, Gross Ton	Aug. 16 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$63.50
Basic, Valley	66.00	66.00	66.00	66.00	62.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	66.26
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	59.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	66.70
Malleable, Valley	66.50	66.50	66.50	66.50	63.00
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$35.50	$35.50	$35.50	$30.50	$54.00
No. 1 Heavy Melt, E. Pa.	40.00	40.00	39.00	34.00	57.00
No. 1 Heavy Melt, Chicago	39.50	38.50	36.50	31.50	59.00
No. 1 Heavy Melt, Valley	39.50	38.50	38.50	33.50	64.50
No. 1 Heavy Melt, Cleve.	36.50	35.50	35.50	31.50	62.00
No. 1 Heavy Melt, Buffalo	31.50	31.50	31.50	29.50	54.50
Rails, Rerolling, Chicago	58.50	58.50	58.50	53.50	80.50
No. 1 Cast, Chicago	42.50	42.50	41.50	42.50	53.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$16.00	$15.00	$15.00	$15.00	$14.50
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	17.50
Owen, Fdry., Milwaukee	32.00	32.00	32.00	32.00	29.50

Steel Prices

Mill base prices as reported to STEEL, Aug. 16, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 94; footnotes, page 96.

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)

Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rolling (NT)

Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 .....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)

Bessemer,Pa. U5 .....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 .....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14 .99.50
S.Duquesne,Pa. U5 ...99.50
S.SanFrancisco B3 ...109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32. .119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3. .121.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2. .119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 .....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14 .119.00
S.Duquesne,Pa. U5 ..119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14 .122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP

Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. P5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS

AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 .....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 .....6.65
Monessen,Pa. P7 .....6.40
N.Tonowanda S47 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14. .6.40
SparrowsPoint,Md. B2. .6.50
Sterling,Ill.(1) N15 .....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 .....6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 .....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 .....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 .....5.50

Wide Flange

Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N5 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14 ..6.80

H.S., L.A., Std. Shapes

Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1 .8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 .....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14 ..8.05
S.SanFrancisco B3 .....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ....5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ...5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
Granite City,Ill. G4 .....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B2 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron

Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy

Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

PLATES, Ingot Iron

Ashland c.l. (15) A10 ..5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R22 .....6.05
Warren,O. R2 .....6.05

FLOOR PLATES

Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor, Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ...5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ...5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ...5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
N.Tonawanda S47 .....5.675
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9) B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2, U5..5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1.6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ...6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
N.Tonawanda S47 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14 6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,PPa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 .....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 .....8.30
S.SanFrancisco B3 .....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,P.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ...5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron

Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Loaded (Including loaded extra) Carbon

LosAngeles P2, S30 ..11.75*

Alloy

Ambridge,Pa. W18 ....10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.10
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ...7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.16
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ....8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)

Cumberland,Md.(5) C19 6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.25
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark, Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 ....9.025

Hammond,Ind. J5, L2 ..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
N.Tonawanda S47 ....9.025
Plymouth,Mich. P5 ...9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 .....5.00
Birmingham C15 .....5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fontana,Calif. K1 ....6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland, Oreg. O4 ....6.425
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. W14 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2 .5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks.(D.R.) L5 ...20.50
McK.Rks.(DirRolled)L5 13.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1 5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 ..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14 7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2 .7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 ..6.275
Steubenville,O. W10 ....6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	....7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	....7.125	7.375
GraniteCity,Ill.G4	7.225	....
Ind.Harbor I-2	..7.225	7.425
Irvin,Pa. U5	....7.125	7.375
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	...7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	....7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) 9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland (28) R2 .....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 .....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2 .6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ..6.975*
Ind.H'rb'r,Ind. I-2, Y1 6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Corp.

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ..5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ...5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ...5.85
Warren,O. R2 .....5.10
Weirton, W.Va. W6 ....5.10
Youngstown U5, Y1 ...5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ...8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 ....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ...8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1.7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ..5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 ....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.425
Ind.Harbor,Ind. Y1 ...7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10.7.875
NewBritain,Con. S15 ..7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2...7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8 7.975
Philadelphia P24 .....7.875
Riverdale,Ill. A1 .....7.425
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975
Youngstown Y1 .....7.425
Youngstown S41 .....7.425

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie,Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 ....15.55
Pawtucket,R.I. S8 ...15.90
Riverdale,Ill. A1 ....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrel,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	...	...	...	...
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	...	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	...
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	...	...
Detroit D2	9.05	10.50	12.70	15.70	...
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	...
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	...
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	...	...	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	...
LosAngeles S41	11.15	12.60	14.80	...	...
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	...
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	...
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	...
NewYork W3	...	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	...	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	...	...
Fostoria,O. S1	19.05	22.15	...
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	...	...
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

TIN MILL PRODUCTS

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Basis Weight 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Electrolytic (100 lb basis wt)	0.25 lb Coating
Aliquippa,Pa. J5	$9.10
Fairfield,Ala. T2	9.10
Fairless,Pa. U5	9.10
Fontana,Calif. K1	9.75
Gary,Ind. U5	9.10
GraniteCity,Ill. G4	9.20
Ind.Harb.,Ind. I-2, Y1	9.10
Irvin,Pa. U5	9.10
Niles,O. R2	9.10
Pittsburg,Calif. C11	9.75
SparrowsPt.,Md. B2	9.10
Weirton,W.Va. W6	9.10
Yorkville,O. W10	9.10

ELECTRO. TIN-COATED SHEET

(20-27 gage; per 100 lb)

IndianaHarb.,Ind. Y1 ..$7.90

(21-27 gage; per 100 lb)

Aliquippa,Pa. J5 .....$7.90
Niles,O. R2 .....7.90

TIN PLATE, HOT DIPPED COMMON COKE	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.20
Fairless,Pa. U5 .....8.20
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.20
GraniteCity,Ill. G4 .....8.30
Ind.Harbor,Ind. I-2, Y1.8.20
Irvin,Pa. U5 .....8.20
Niles,O. R2 .....8.20
Pittsburg,Calif. C11 ....8.85
SparrowsPoint,Md. B2 ..8.20
Weirton,W.Va. W6 .....8.20
Yorkville,O. W10 .....8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 .....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ...7.525*
McKeesport,Pa. E10 ..7.50*
NewCastle,Pa. M23 ...7.425*
Riverdale,Ill. A1 ....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41 ....7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	.....	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	...	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	.....	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	.....	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	.....	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	.....	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	.....	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	.....	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
Beech Bottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5 ..	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 ....8.00
Crawfordsville,Ind. MS..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 ....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ...8.25
Monessen,Pa. P7, P16 ..8.00
N.Tonawanda S47 .....8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ...8.95
Portsmouth,O. P12 ....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ...8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ...8.30

WIRE, Cold Heading Carbon

Elyria,O. WS 8.00
N.Tonawanda S47 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2 .12.65
KansasCity,Mo. U3 ....12.90
LosAngeles(2) B3 .....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 ...10.06
Pittsburg,Calif. C11 ..10.075
Portsmouth,O. P12 ...9.75
Roebling,N.J. R5 .....10.06
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ..10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....9.75
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.06

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 ....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.20
Milbury,Mass.(12) N6 .10.06
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.20
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 ....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ..10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.06
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.06

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. MS.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 ....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C10 ...16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S41 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 ....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ..13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ...13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. MS	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. MS	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. MS	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. MS	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. MS	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler
(14½ Ga.) (per 97 lb net box)
Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. MS	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. MS	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	8.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.
100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. MS	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. MS	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim
100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. MS	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. MS	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. MS	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. MS	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. MS	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. MS	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville MS	17.95	19.80†‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80†‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	19.10	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½Ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. MS	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. MS	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

6 to 8 gage	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55
Houston(48) S5	9.25	9.80**
Jack'vill.Fla. M8	9.10	9.80†‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

FASTENERS

SCREWS, NUTS, BOLTS

(Consumer discounts per cent off list prices, plain finishes. For less than full container quantities, add 25 per cent; attaching nuts to bolts in sizes ¼ in. through ⅝ in. diameter through 8 in. in length, price on application. Discounts are determined by the quantity of screws, nuts, and bolts ordered for one destination at one time.)

Base, one keg	43.00
20,000 lb or more	53.00

SCREWS, SETSCREWS

Hex Screws and High Strength Hex Screws, through 1 in. x 12 in.:
Base, one keg 43.00
20,000 lb or more .. 53.00

Hex Screws 1⅛ in. diameter and larger: See net price schedule.

Fillister Head Screws, coarse thread:
Packages .....+70.00
Bulk .....+28.00

Flat Head Screws, coarse thread:
Packages .....+100.00
Bulk .....+52.00

Setscrews, Square Head, Cup-point, coarse thread:
Packages .....+10.00
Bulk 15.00

(Bulk discounts on fillister, flat head, and set screws apply only to products ordered in these minimum quantities: ¼ in. through ⅝ in. diameter, 15,000 pieces; ⅞ in. through ⅝ in diameter, 5000 pieces; and ¾ in. through 1 in. diameter, 2000 pieces.)

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.
Structural ½ in. larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Toe Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

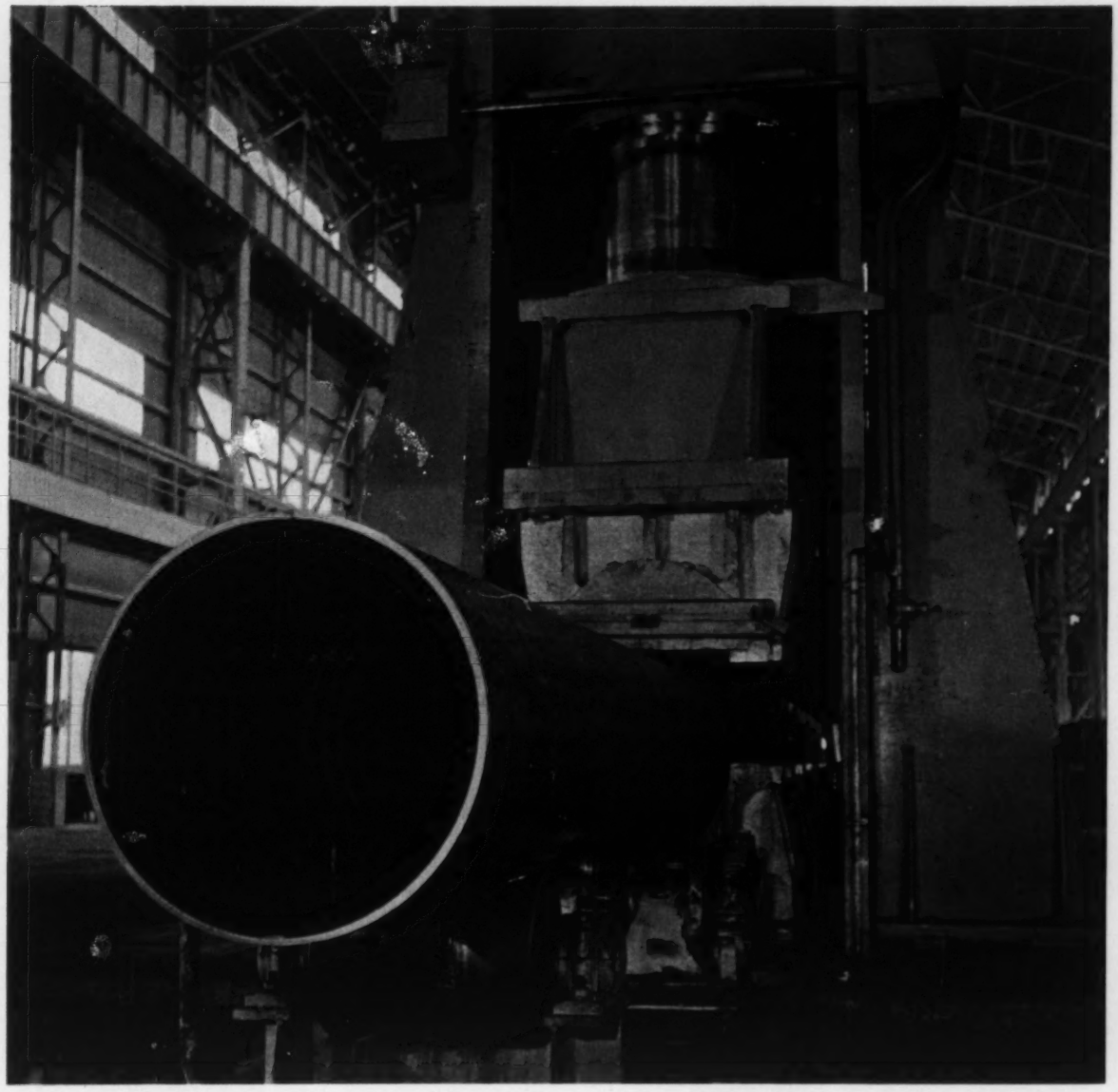
Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.



DEPENDABLE NKK LARGE DIAMETER HIGH PRESSURE WELD PIPE

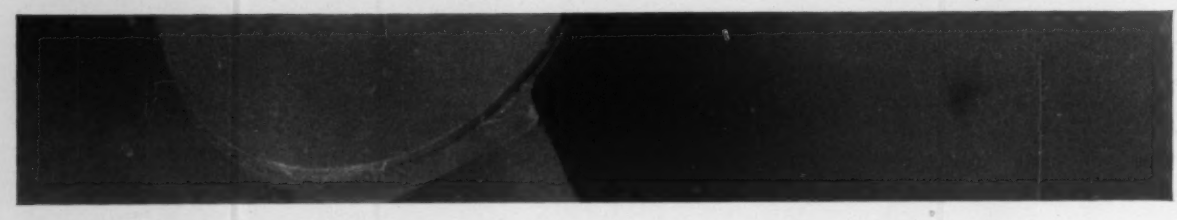
In this age of oil and gas, pipe line is playing increasingly prominent role. Nippon Kokan, with half a century of solid record in pipe-making, is ready to meet increased demands for large diameter high pressure weld pipes. NKK high test line pipes are made to universally accepted API 5LX standards, or similar specifications, in a modern mill equipped with the latest in U-O-E process installation. NKK high test line pipes are 100% dependable in quality, perfectly uniform in analyses, perfectly accurate in wall thickness and outside diameter, perfectly round and straight, perfectly welded. Write for details and catalogs.

Steel: Tubular Products — Bars and Shapes — Plates and Sheets Ship: Shipbuilding & Ship Repairs Fabricated Steel Structures

NKK **NIPPON KOKAN K.K.**
(Japan Steel & Tube Corporation)

Head Office: 2, 1-chome, Otemachi, Chiyoda-ku, Tokyo, Japan
Cable Address: STEELTUBE TOKYO, KOKANSHIP TOKYO
New York Office: Rm. 1115, 39 Broadway, New York 6, N.Y., U.S.A.
European Office: Kreuz Str., 34 II Duesseldorf, West Germany
Singapore Office: Rm. 414, Shaw House, Orchard Road, Singapore

Simple changes save fastener $$



Value analysis of your current fastener practices by RB&W technical advisors can result in substantial cost reductions

Here are typical savings made possible through recommendations by RB&W fastener specialists...made after carefully analyzing product design and assembly upon request.

Manufactured product	Cost Reductions Made Possible
Automatic machine assemblies	$97,000 per year
Cooler-and-condenser units	$16,500 per year
Refrigeration units	$ 7,800 per year
Compressors	$12,000 per year

The striking thing about all these cost reductions is that they required merely a substitution to be realized ...a standard high strength bolt rather than a special alloy fastener ...a hex screw in place of a socket screw. No product design changes were involved.

How about a survey of your own fastening operations? Wherever fasteners are used in quantity, there are bound to be areas where you can shave costs simply by having assembly specifications altered. An RB&W fastener specialist, working with your engineers, can locate them for you. He's no smarter than your own people, but knows his specialty best and also what to look for. Write Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Sales office and warehouse at:** San Francisco, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1¼		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	H.R. Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54 50	57.50	54.75	65.50	62.25
380	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Phoenix Steel Corp.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloy Steel Co., Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base—Cold Rolled—10%	Strip, Carbon Base—Cold Rolled—Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Claymont, Del. P4, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham K2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.50	10.26	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.13	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.18	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	10.50	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	7.91	11.57
Indianapolis	9.66	10.64	10.57	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10 35	11.20	12.10	12.40	10.25	14.20	17 35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.27	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.57	10.55	11.05	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.54	12.37	10.05	13.25	16.40	10.35	9.79	11.82
New York	10.07	10.78	11.35	12.37	10.44	13.25	16.40	10.90	10.22	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	10.51	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	11.74	9.57	11.49	16.54	9.92	9.41	11.70
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ¼ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

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Now save space and money with the all new Cutler-Hammer Ac-Magnetic Starter. The new Size 00 fits about 40% of the applications where the Size 0 is now used. You still get the famous Three Star line quality—same high reliability—famous vertical, dust-free silver contacts. Max. hp ratings: 3 phase: 208/220V., 1½ h.p. 440/550V., 2 h.p. Single phase: 115V., ½ h.p. 230V., 1 h.p. Get it open or in NEMA 1 enclosure. Send for Pub. LO-40-R213.

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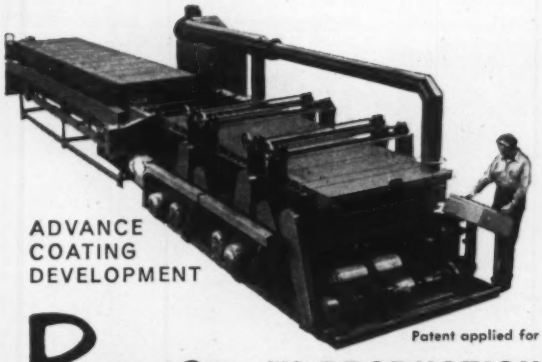

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Patent applied for

Proven IN PRODUCTION

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- **Heavy-duty design**
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ROTH corporation
LORAIN, OHIO

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* Instrument Society of America

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KANTHAL

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Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City., Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellesville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Nario, Ohio, $87.50. Dolomite-Magnesite: Nario, Ohio, $109.50. Magnetite: Nario, Ohio, $128.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅝ in. grains bulk, Luning, Nev., $46; ⅝ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:
Carbon (N.T.):
Forging $97.00
Rerolling 78.00
Alloy (N.T.) 115.00

Wire Rods:
Carbon 5.70
Alloy 6.40

Wire (carload lots):
Merchant annealed . 8.40
Low carbon indus. . 7.20
Upholstery spring .. 8.55
M.B. spring 8.85

Bars & Small Shapes:
Carbon, merchant .. 5.30
Carbon, special 5.85
Alloy 6.40

Bar Mill Brands:
Carbon 5.40
Alloy 8.05

Bars, Reinforcing ... 5.30

Structural Shapes:
Standard carbon ... 5.50
Angles & zees 5.40

Plates, Carbon:
Sheared 5.45
Universal mill 5.10

Sheets & Coils, Hot Rolled:
Carbon sheet 4.95
Carbon strip 5.00

Sheets & Coils, Cold Rolled:
Carbon sheet 6.35
Carbon strip:
(0.080 and lighter) 6.35
(0.081 and heavier) 6.35

Sheets & Coils, Galvanized:
Standard quality ... 6.70
Culvert quality 7.00

Sheets, Porcelain Enameling 7.45

Sheets & Coils, Electrical:
Field grade 9.00
Electrical grade 10.15

Sheet Piling 6.15

Skelp 4.70

Rails, Heavy 5.55

Rails, Light 5.70

Joint Bars 6.55

Tie Plates 6.35

Grinding Balls (3 in. diam.) 7.00

Tin Mill Products (Per base box; 100 lb base wt)
Coke tin plate (1.25 lb pot yield) $10.60
Electrolytic tin plate (0.25 lb coating). 9.10
Black plate 8.30

Nails, Wholesale:
Carload lots ....Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $29-$29.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. truckiots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	7.50††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	27.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe.	36.75, ton deld. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh) ...	58.0
Carbonyl Iron:	
90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90/10.	56.80
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types ...	0.78-1.06
Nickel-Silver	56.00
Solder	7.00*
Stainless Steel, 304 ...	89.00
Stainless Steel, 316 ...	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20

Cobalt:	Dollars
98.5%, minus 100-300 mesh ..	1.57-1.58
99.5%, below 5 microns	2.32
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer $11.45
Mesabi bessemer 11.60
Old Range nonbessemer 11.70
Old Range bessemer 11.85
Open-hearth lump 12.70
High phos. 11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports 25.00†
Chilean, 62-65%, c.i.f. Atlantic ports ... 22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton $11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality $15.75-16.25*
Domestic, concentrates, f.o.b. milling points 22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1 ..... $34.00-35.00†
48% no ratio ..... 25.00-26.00†

South African Transvaal

44% no ratio 18.75
48% no ratio ..... 24.00-26.00†

Turkish

48% 3:1 ..... 35.00-37.00†

Domestic

Rail nearest seller

18% 3:1 ..... 30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60% $3.00-3.50
60-65% 3.60-4.00

Vanadium Ore

Cents per lb V_2O_5

Domestic 31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa. furnace $14.75-15.25
Connellsville, Pa. foundry 18.00-18.50

Oven Foundry

Birmingham, ovens $30.35
Cincinnati, deld. 33.34
Buffalo, ovens 32.00
Chattanooga, Tenn., ovens 30.80
Detroit, ovens 32.00
Pontiac, Mich., deld. 34.05
Saginaw, Mich., deld. 35.63
Erie, Pa., ovens 32.00
Indianapolis, ovens 31.25
Ironton, Ohio, ovens 30.50
Cincinnati, deld. 33.64
Kearny, N. J., ovens 31.25
Milwaukee, ovens 32.00
Neville Island (Pittsburgh), Pa., ovens.. 30.75
New Haven, Conn., ovens 31.00
Painesville, Ohio, ovens 32.00
Cleveland, deld. 34.45
Philadelphia, ovens 31.00
St. Louis, ovens 33.00
St. Paul, ovens 31.25
Chicago, deld. 34.78
Swedeland, Pa., ovens 31.00
Terre Haute, Ind., ovens 31.25

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305 ...	$5.65	$5.70	$5.60	$5.50	$5.80
Bar Size Angles	5.85	5.90	5.80	5.70	6.00
Structural Angles	5.75	5.80	5.70	5.60	5.90
I-Beams	5.65	5.70	5.60	5.50	5.80
Channels	5.75	5.80	5.70	5.60	5.90
Plates (basic bessemer)	5.45	5.50	5.40	5.30	5.60
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	*23.66*	*23.72*	*23.59*	*23.31*	*25.04*
Barbed Wire (†)	6.25	6.30	6.20	6.10	6.40
Merchant Bars	5.95	6.00	5.90	5.80	6.10
Hot-Rolled Bands	5.95	6.00	5.90	5.80	6.10
Wire Rods, Thomas No. 5 (Niederrhein)	5.80*	5.90	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00*	6.10	5.95	5.95	6.20
Bright Common Wire Nails (§)	7.35	7.40	7.30	7.20	7.50

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier. *Except Boston.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

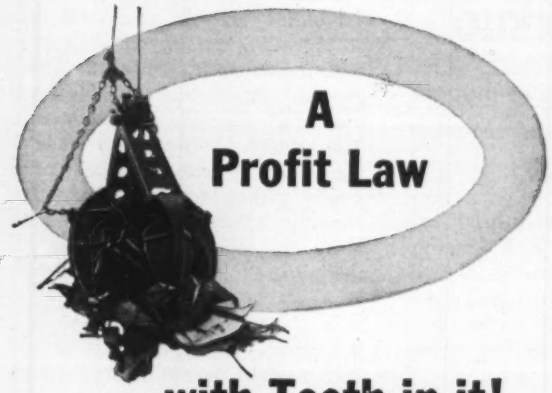
Pure benzene 34.00
Xylene, industrial grade 29.00
Creosote 24.00
Naphthalene, 78 deg. 6.00
Toluene, one deg. (deld. east of Rockies) 25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade 14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade $32.00



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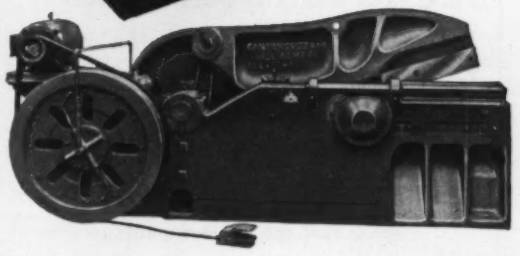
Alligator Shears



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Bulletin S60 gives details.

Quality plus economy when you buy SUMITOMO steel wire rods

Rapid developments in the wire-product field have increased industry's demand for top-quality steel wire rods. Because of its international reputation for reliability, Sumitomo Metal supplies world markets — America in particular — with 7,000 tons of wire rods every month. To keep up with this export demand, Sumitomo Metal has added to its present facilities another new wire rod mill, completely equipped with the most modern machinery available.

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Scrapmen Expect Buying Pickup

Rising steelmaking operations over coming weeks are thought likely to stimulate an active demand for metallics. Market appears firm with STEEL's index higher at $38.33

Scrap Prices, Page 106

• **Chicago**—While the market has a stronger tone in anticipation of improved steel demand next month, confirmed purchases of limited tonnages of scrap show only a few grades have advanced $1 a ton. They include: No. 1 factory bundles, $44, and No. 1 railroad heavy melting, $43.

• **Pittsburgh** — Except for railroad specialties, prices are unchanged. Bids on Pennsylvania Railroad scrap were up 40 cents to $1 a ton. Part of the carrier's No. 1 heavy melting scrap remained in the East for export.

• **Philadelphia**—No. 2 heavy melting steel is up $1 a ton, now being quoted $36, delivered. Other grades are unchanged. Contributing to the market steadiness are light collections of industrial and yard scrap, combined with a reasonably good flow of material abroad. The export movement is well down from last May's, but it has been holding steady over the last several weeks.

• **New York** — Brokers' buying prices are unchanged, with export demand sustaining the market on the major steelmaking grades. Little tonnage is moving on domestic account, except cast material.

• **Cleveland**—Scrapmen anticipate a pickup in buying as steelmaking operations rise over the next couple of months. They think the market will hold steady the remainder of this month, with monthend bids on industrial material pointing the way for prices. Supplies of automotive scrap are smaller.

• **Buffalo**—A small tonnage of No. 2 bundles was sold to a local mill at prevailing prices, reflecting stability in the district market. Dealers don't look for any sizable business until the start of next month. The outlook for September trade is considered promising due to a steady pickup in steel production recently. Some prime grades of scrap are reported moving out of this district to the Youngstown area.

• **Detroit**—The market is steady with a slight strengthening in dealer-to-dealer transactions noted. There are no major orders outstanding and no changes in list prices are in prospect. Dealers and brokers think prices will hold at present levels the rest of this month.

• **Cincinnati** — Prices are unchanged in the absence of a new buying test. However, the trade is talking in terms of a $1 to $2 a ton increase next month when two district mills are expected to resume buying.

• **St. Louis**—No. 1 heavy melting steel is quoted higher at $35 on an

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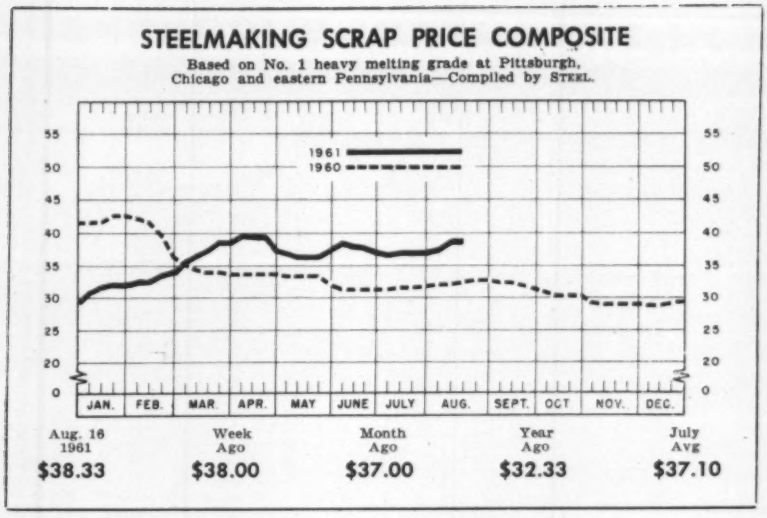

order placed last week. Dealers report a strong undertone in the market, with out-of-town interest in local scrap imparting a stimulating effect.

• **Birmingham** — The market appears to be a little firmer, though there's a lot of automobile scrap available. However, dealers say material is not coming into their yards as well as they'd like to see it. Prices are fluctuating. Some grades are up, and others are down.

• **Houston**—Prices have strengthened on new mill demand. Premium grades are up an average of $2 a ton on purchases for delivery through mid-September. Purchases included plates and structurals, No. 1 bundles, clips, turnings, sheared and baled material. Suppliers are reported scrambling for unprepared scrap.

Export prices are unchanged. Some remote purchases for export, however, have been made at higher levels than are generally quoted here. Shippers as far away as Oklahoma have been quoted up to $40.50 f.o.b. for No. 1 steel. Baton Rouge-New Orleans prices range up to $42 for No. 1 heavy melting.

• **Seattle** — Mill buying has increased and is reflected in a slightly firmer market. No. 1 heavy melting steel demand exceeds supply. However, some grades of cast scrap are weak with buyers showing little interest in dealers' offerings.

Exporters are meeting current commitments. It's expected that Japan will enter the market next month for fourth quarter requirements. Expectations are higher prices for export will prevail.

• **Los Angeles**—Supply and demand appear to be about in balance. Domestic mills are re-entering the market, and some tonnage is being moved for export.

• **San Francisco**—Exports are providing the only activity in this market, and there may be a dropoff in that area since the Japanese are reported seeking less tonnage for the fourth quarter than they bought for the third.

Scrap Stocks Increase as June Consumption Falters

Consumption of ferrous scrap totaled 4,946,000 gross tons in June, 7 per cent down from use in May, reports the Bureau of Mines. The total charge of scrap and pig iron (10,190,000 tons) consisted of 49 per cent scrap and 51 per cent pig iron vs. 50 per cent scrap and pig iron in May.

Domestic consumers' stocks of scrap on June 30 totaled 7,495,000 tons, slightly more than on May 21 when the total was 7,404,799 tons. Stocks of pig iron held by consumers and suppliers at the end of June dropped 4 per cent from the preceding month's total, amounting to 2,727,000 tons.

Home scrap produced during June accounted for 3,007,000 tons, a small decrease from May.

Iron ore . . .

Iron Ore Prices, Page 102

Shipments of iron ore from the head of the Great Lakes in July totaled 9,922,964 gross tons, reports the American Iron Ore Association. That was down 2,145,126 tons from shipments of 12,067,360 in the same month a year ago.

The total lake movement for the 1961 season to the end of July was 24,158,994 tons, off 18,086,965 tons from the 42,245,959 tons moved to the end of July in the 1960 lake shipping season.

Pig Iron . . .

Pig Iron Prices, Page 100

Export demand provides the bright spot in the merchant pig iron market in several districts. Sizable tonnages are moving via the St. Lawrence Seaway and from Atlantic and Pacific ports. Producers anticipate little improvement in domestic business until after Labor Day. They do not expect brisk trading much before October.

Blast furnace output in June rose to 5,730,198 tons, including 43,-

(*Please turn to Page* 111)

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Iron and Steel Scrap

STEELMAKING SCRAP COMPOSITE

Aug. 16	$38.33
Aug. 9	38.00
July Avg.	37.10
Aug. 1960	32.33
Aug. 1956	57.13

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Aug. 16, 1961. *Changes shown in italics.*

PITTSBURGH

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	29.00-30.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	23.00-24.00
No. 1 busheling	35.00-36.00
No. 1 factory bundles	46.00-47.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Short turnings	19.00-20.00
Cast iron borings	18.00-19.00
Cut structurals:	
2 ft and under	42.00-43.00
3 ft and under	39.00-40.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	43.00-44.00
Electric furnace bundles	43.00-44.00
Cast Iron Grades (F.o.b. shipping point)	
No. 1 cupola	34.00-35.00
Stove plate	34.00-35.00
Unstripped motor blocks	24.00-25.00
Clean auto cast	35.00-36.00
Drop broken machinery	45.00-46.00‡
Railroad Scrap	
No. 1 R.R. heavy melt.	40.00-41.00
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	45.00-46.00
Angles, splice bars	44.00-45.00
Railroad specialties	*46.00-47.00*
Rails, rerolling	59.00-60.00
Stainless Steel Scrap	
18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	85.00-90.00
410 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*40.00-41.00*
No. 1 hvy melt., dealer	*38.00-39.00*
No. 2 hvy melting	*33.00-34.00*
No. 1 factory bundles	*43.00-44.00*
No. 1 dealer bundles	*39.00-40.00*
No. 2 bundles	*23.00-24.00*
No. 1 busheling, indus.	*40.00-41.00*
No. 1 busheling, dealer	*38.00-39.00*
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	44.00-45.00
Punchings & plate scrap	44.00-45.00
Cast Iron Grades	
No. 1 cupola	42.00-43.00
Stove plate	37.00-38.00
Unstripped motor blocks	33.00-34.00
Clean auto cast	47.00-48.00
Drop broken machinery	47.00-48.00
Railroad Scrap	
No. 1 R.R. heavy melt.	*42.00-43.00*
R.R. malleable	47.00-48.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Angles, splice bars	46.00-47.00
Axles	56.00-57.00
Rails, rerolling	58.00-59.00
Stainless Steel Scrap	
18-8 bundles, solids	*190.00-195.00*
18-8 turnings	*110.00-115.00*
430 bundles & solids	*95.00-100.00*
430 turnings	*55.00-60.00*

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00
Cast Iron Grades (F.o.b. shipping point)	
No. 1 cupola	37.00-38.00
No. 1 machinery	44.00-45.00
Railroad Scrap	
Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Railroad specialties	41.00-42.00
Rails, rerolling	63.50-64.50

CLEVELAND

No. 1 heavy melting	*36.00-37.00*
No. 2 heavy melting	24.00-25.00†
No. 1 factory bundles	42.00-43.00
No. 1 bundles	*36.00-37.00*
No. 2 bundles	23.00-24.00†
No. 1 busheling	*36.00-37.00*
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	30.00-33.00
Cut structurals, plate, 2 ft and under	41.00-42.00
Low phos, punchings & plate	37.00-38.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	*38.00-39.00*
Cast Iron Grades	
No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	47.00-48.00
Burnt cast	32.00-33.00
Drop broken machinery	48.00-49.00
Railroad Scrap	
R.R. malleable	*48.00-49.00*
Rails, 2 ft and under	*49.00-50.00*
Rails, random lengths	*45.00-46.00*
Rails, 18 in. and under	*50.00-51.00*
Cast steel	*42.00-43.00*
No. 1 railroad cast	*49.00-50.00*
Railroad specialties	*44.00-45.00*
Angles, splice bars	*45.00-46.00*
Rails, rerolling	*56.00-57.00*
Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)	
18-8 bundles, solids	160.00-165.00
18-8 turnings	95.00-100.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	*39.00-40.00*
No. 2 heavy melting	25.00-26.00†
No. 1 busheling	*40.00-41.00*
No. 1 bundles	40.00-41.00
No. 2 bundles	25.00-26.00†
Machine shop turnings	14.00-15.00†
Shovel turnings	19.00-20.00†
Cast iron borings	19.00-20.00†
Low phos.	41.00-42.00
Electric furnace bundles	41.00-42.00
Railroad Scrap	
No. 1 R.R. heavy melt.	*41.00-42.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)	
No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	28.00-29.00
No. 1 bundles	34.00-35.00
No. 2 bundles	20.50-21.50
No. 1 busheling	33.00-34.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00
Cast iron borings	11.00-12.00
Low phos., 18 in.	40.00-41.00
Cast Iron Grades	
No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	46.00-47.00
Railroad Scrap	
No. 1 R.R. heavy melt.	36.00-37.00
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	41.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	*35.00*
No. 2 heavy melting	29.00
No. 1 bundles	35.00
No. 2 bundles	24.00
No. 1 busheling	34.00
Machine shop turnings	13.50
Shovel turnings	17.00
Cast Iron Grades	
No. 1 cupola	37.00
Charging box cast	34.00
Heavy breakable cast	32.00
Unstripped motor blocks	34.00
Clean auto cast	38.00
Stove plate	33.00
Railroad Scrap	
No. 1 R.R. heavy melt.	38.50
Rails, random lengths	39.00
Rails, rerolling	55.00
Rails, 18 in. and under	44.00†
Angles, splice bars	40.00†

PHILADELPHIA

No. 1 heavy melting	40.00
No. 2 heavy melting	*36.00*
No. 1 bundles	43.00
No. 2 bundles	24.00-26.00
No. 1 busheling	43.00
Electric furnace bundles	44.00
Mixed borings, turnings	17.00†
Shovel turnings	20.00
Machine shop turnings	14.00
Heavy turnings	25.00†
Structurals & plates	44.00-46.00
Couplers, springs, wheels	45.00
Rail crops, 2 ft & under	51.00-53.00
Cast Iron Grades	
No. 1 cupola	40.00
Heavy breakable cast	40.00
Drop broken machinery	49.00-50.00†
Malleable	49.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	34.00-35.00
Cast Iron Grades	
No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00
Stainless Steel	
18-8 sheets, clips, solids	160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)	
No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	35.00-36.00
No. 2 bundles	23.00-24.00
No. 1 busheling	31.00-32.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00
Cast Iron Grades	
No. 1 cupola	32.00-33.00
Mixed cast	30.00-31.00
Stove plate	27.00-28.00
Heavy breakable	26.00-27.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	39.00-40.00
Stainless Steel Scrap	
18-8 bundles & solids	170.00-175.00
18-8 turnings	70.00-75.00
430 bundles & solids	70.00-75.00

BIRMINGHAM

No. 1 heavy melting	*37.00-38.00*
No. 2 heavy melting	*30.00-31.00*
No. 1 bundles	*37.00-38.00*
No. 2 bundles	*22.00-23.00*
No. 1 busheling	38.00-39.00
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	20.00-21.00
Bar crops and plate	42.00-43.00
Structurals & plate	42.00-43.00
Electric furnace bundles	38.00-39.00
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	37.00-38.00
Cast Iron Grades	
No. 1 cupola	42.00-43.00
Stove plate	42.00-43.00
Unstripped motor blocks	31.00-32.00
No. 1 wheels	34.00-35.00
Railroad Scrap	
No. 1 R.R. heavy melt.	39.00-40.00
Rails, 2 ft and under	46.00-47.00
Rails, random lengths	41.00-42.00
Angles, splice bars	*43.00-44.00*

HOUSTON

(Brokers' buying prices; f.o.b. car)	
No. 1 heavy melting	35.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	*38.00-39.00*
No. 2 bundles	*23.00-24.00*
Machine shop turnings	*12.50-13.00*
Crushed turnings	*17.00*
Low phos. plate & structurals:	
3 ft	*41.00-42.00*
2 ft and under	*45.00-46.00*
Cast Iron Grades	
No. 1 cupola	*37.00-38.00*
Heavy breakable	*25.00-26.00*
Foundry malleable	*29.00-30.00*
Unstripped motor blocks	*30.00-31.00*
Railroad Scrap	
R.R. heavy melt. (3 ft)	*40.00-41.00*

LOS ANGELES

No. 1 heavy melting	40.00-41.00
No. 1 hvy melt (export)	42.00-44.00
No. 2 heavy melting	37.00-39.00
No. 2 hvy. melt (export)	41.00
No. 1 bundles	34.00-35.00
No. 2 bundles	26.00-28.00
No. 2 bundles (export)	28.00-30.00
Machine shop turnings	15.00-17.00
Shovel turnings	15.00-17.00
Cast iron borings	16.00-17.00
Electric furnace scrap	50.00
Cast Iron Grades	
No. 1 cupola	44.00-46.00
Railroad Scrap	
No. 1 R.R. heavy melt.	43.00-45.00

PORTLAND, OREG. (Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	41.00-42.00
No. 2 bundles	31.00
Shovel turnings	18.00
Electric furnace	54.00
Cast Iron Grades	
No. 1 cupola	41.00
Heavy breakable	38.00
Unstripped motor blocks	39.00
Stove plate (f.o.b. plant)	37.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	46.00
No. 1 hvy (unprepared)	41.00
No. 2 heavy melting	43.00
No. 2 hvy (unprepared)	38.00
No. 2 bundles	32.00
Shovel turnings	16.00-18.00
Electric furnace	52.00
Cast Iron Grades	
No. 1 cupola	41.00
Heavy breakable cast	38.00
Stove plate (f.o.b. plant)	36.00
Unstripped motor blocks	37.00

SAN FRANCISCO

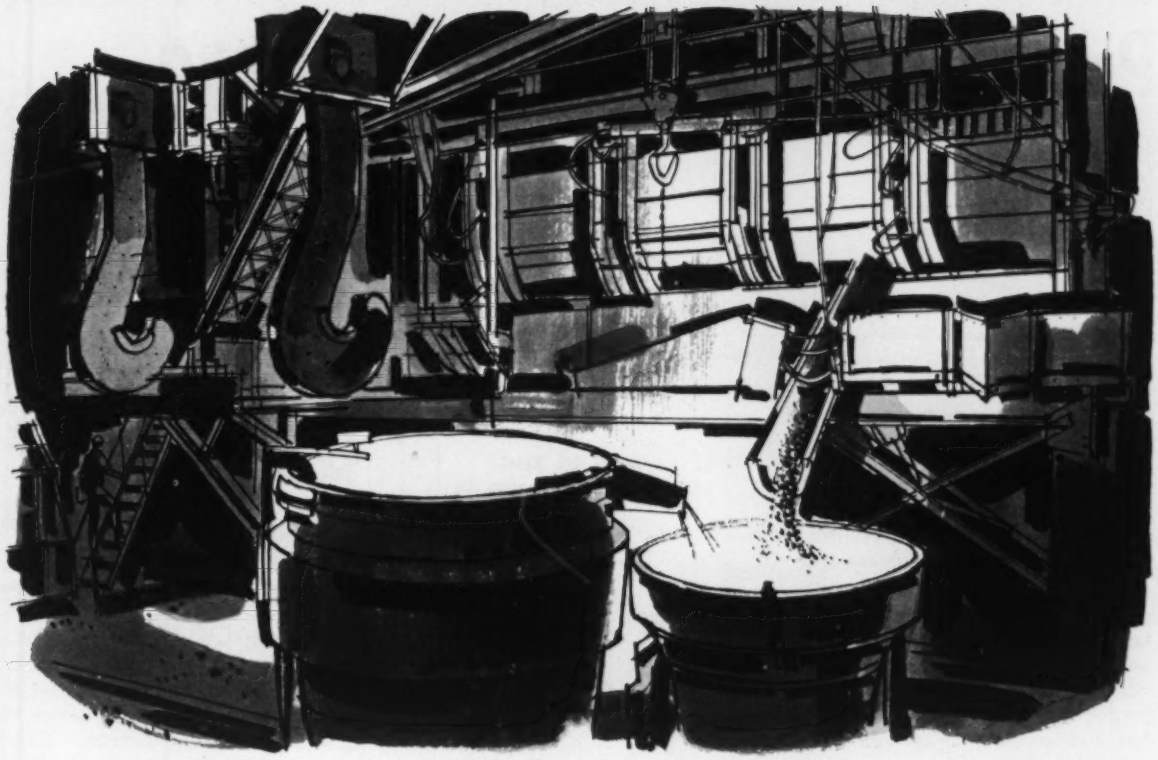
No. 1 heavy melting	43.00**
No. 2 heavy melting	40.00**
No. 1 bundles	34.00**
No. 2 bundles	28.00**
Machine shop turnings	18.00
Mixed borings, turnings	18.00
Cast iron borings	18.00
Heavy turnings	18.00
Shovel turnings	18.00
Cast Iron Grades	
No. 1 cupola	46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)	
No. 1 heavy melting	31.00
No. 2 hvy melt, 2 ft & under	30.00
No. 1 bundles	31.00
No. 2 bundles	23.50
Mixed steel scrap	23.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	31.00
Unprepared	25.00
Shovel turnings	12.00
Cast Iron Grades‡	
No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

DANGEROUS INTRUDERS IN IRON AND STEEL



ARSENIC . . . FRIEND OR FOE?

Arsenic is useful for the resistance to corrosion and erosion which its presence imparts to copper and arsenic bronze. Alloyed with lead, it facilitates the forming of perfect spheres in producing shot.

Its presence in a steel composition, however, is another matter. Arsenic is likely to make its first appearance in the raw materials entering the blast furnace. Present in any quantity either in the iron ores or the coke, it will appear in the pig iron and eventually find its way into the finished steel. A certain amount may also be present in contaminated scrap.

In quantities of more than one percent, arsenic may reduce the ductility and impact strength of steel and eventually cause surface cracking. Even small amounts may induce loss of toughness in chromium-nickel steels in the heat treated condition. Compared with some of the other residual elements, arsenic has not been one of the major enemies present in steel but it is an element that bears consideration and continued study.

For scrap of known analysis, our personnel, equipment and strategically located facilities are specifically geared for the purchase or sale of dependably segregated metals. We welcome your inquiry.

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Price Cutting Is Still Widespread

Nonferrous Metal Prices, Pages 110 & 111

PRICE SHADING on many metals is still common despite the almost universal pickup in business. There may be a little less quotation paring than there was earlier in the year, but it will take a much greater resurgence in orders than economists predict to fully halt the practice in 1961.

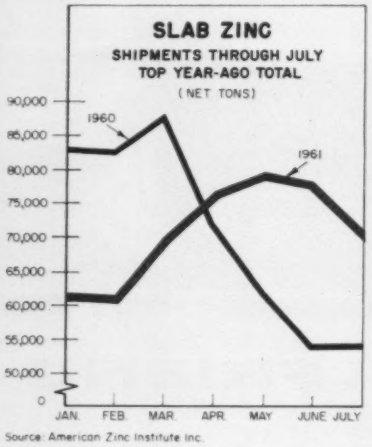
• **New Aluminum Prices** — Aluminum producers have issued their new price lists. A quick check reveals about as many downward revisions as increases. Observers say the move to trim prices in certain categories recognizes that cutting had been taking place. New schedules better reflect market conditions. Rising aluminum sales may spur further hikes before the year is out, but widespread price pruning will probably stay with us.

• **Weakness in Zinc**—Sales of special high grade zinc and diecasting alloy ingots are still weak. The situation has led to a standard discount under quoted prices of 0.5 cent a pound. The only hope for early improvement is a healthy volume of orders from Detroit as the 1962 models start rolling. Prime western sales, spurred by the continuous sheet galvanizers, have taken up the slack. Cumulative shipments of zinc at the end of July rose over the 1960 level for the first time this year (see chart).

Copper prices seem firm but may rise higher before the year is out. Brass mill sales are up, but there's still some price weakness.

• **Leading the Pack**—The tin price is the strongest of any nonferrous metal now. It has settled in the $1.15 to $1.20 range since the hectic gyrations of the late spring and early summer, but that's no guarantee it won't take off again. It could happen before yearend, unless there's some stabilizing influence, like release of stockpile metal.

• **Titanium's Problems** — Even the newer metals aren't immune to price pruning. Titanium is a case in point. A little nibbling at quotations has lowered the composite price about 12 per cent to $6.13 a pound.



Source: American Zinc Institute Inc.

Titanium mill product shipments may be heading for the best year on record. Forecasts made early in the year placed shipments at around 11 million lb, close to the 1957 high of 11.3 million lb. With a good fourth quarter predicted, and the increased funds earmarked for defense, original forecasts may turn out to be conservative.

Aluminum Outlook

The aluminum industry has lost none of its bubbling optimism, despite the ups and downs of the economy and the flops of some forecasts. Many market people are particularly enthusiastic about the transportation field (automotive, marine, railroads, mobile homes, and ordnance). One forecast pegs total usage in transportation by 1965 at 856,000 tons—a gain of 376,000 tons, or 78 per cent, over 1960 shipments.

The biggest increase is predicted for autos, where usage is expected to double by 1965. In that year, 500,000 tons of aluminum will be consumed by carbuilders (based on a 7.5 million car year), say industry sources. That compares with 1960 auto consumption of 250,000 tons (when 6.7 million cars were built).

Here's what's forecast for other transportation categories.

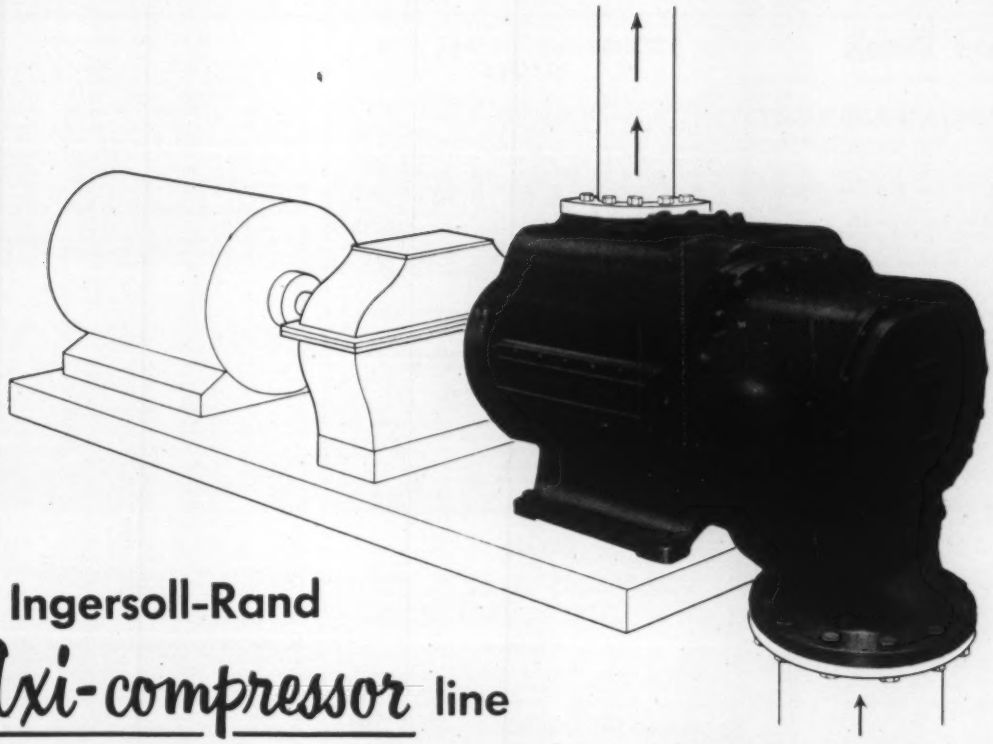
• *Trucks*—Consumption of at least 50,000 tons of aluminum by 1965 (based on a 900,000 to 1 million truck year). Components will include: Diesel engine blocks, wheels, bumpers, and tilt-type cabs.

• *Marine*—The potential is huge in superstructures, anodes, all-aluminum utility vessels, and scores of miscellaneous applications. The pleasure boat market should grow modestly.

• *Railroads* — This market is expected to reach 20,000 tons annually by 1965 (compared with 10,000 tons in 1960). Of this total, about 7500 tons will go into gondola and hoppers cars, the remainder into freight car components. Promising are large poundage components like the 3500 lb boxcar doors recently developed for a major railroad.

• *Military Vehicles* — The trend toward the mobile, airborne striking force is in aluminum's favor. By 1965, this market is expected to take 50,000 tons of the metal compared with 10,000 tons last year. Some 2000 of the M-113 personnel carriers are being built now. Aluminum people say this vehicle weighs half as much as steel, is faster, and has the same ballistic protection.

• *Containers*—Large shipping containers now take about 2500 tons a year; the market will spurt to at least 25,000 tons by 1965, say forecasters. By 1970, it's believed 1 million containers will be in service, the bulk of which will be the 2000 lb van type.

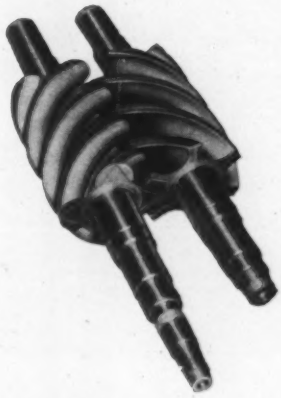


Ingersoll-Rand *Axi-compressor* line extended to HIGHER PRESSURES

- **New Type H Heavy-duty Axi-compressor designs provide compression ratios up to 4.5 per stage**
- **With atmospheric inlet, deliver up to 50 psig discharge pressure**

SUPPLEMENTING the service-proved line of Ingersoll-Rand Axi-compressors, the new Type H units extend the advantages of positive-displacement axial-flow rotary compression to higher pressures than were previously obtainable. Two meshing rotors draw the air or gas in at the outboard end, compress it axially by pulsation-free positive displacement and deliver the pressurized gas through the top discharge at the driver end of the casing.

Features include dynamically-balanced rotors, water-cooled casings and force-feed lubrication to all bearings and timing gears and cooling oil to internally-cooled rotors when required. For many conditions of capacity and pressure, this rotary oil-free positive displacement compressor serves better than either reciprocating or centrifugal compressors. Ask your Ingersoll-Rand engineer for complete information, or send for Bulletin 11,015 today.



ONLY TWO MOVING PARTS
Compression takes place between these two meshing rotors. All motion is rotary and no valves are required.

OIL-FREE COMPRESSION
Since the rotors do not touch each other or the casing, no lubrication is required in the compression chamber.

MINIMUM SPACE REQUIREMENTS
Unusually compact design saves both floor space and head room. Smooth running balance permits small, inexpensive foundations.

Ingersoll-Rand
11 Broadway, New York 4, N.Y.

THE WORLD'S MOST COMPREHENSIVE COMPRESSOR EXPERIENCE

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $40 per lb and up nom.

Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75 deld.

Germanium: Purified, ingots, less than 1 kg 37.50 per gram; 1-10 kg 32.00 per gram; 10 kg or more, 29.95 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $188-191 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pig, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 77.50.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 119.50.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max), $1.37 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.

Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $7.25-7.75 per lb; 100-500 lb, $6.75-7.25 per lb; 500-1000 lb, $6.25-6.75; over 1000 lb, $6.25 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 21.75-22.25; 5% silicon alloy, 0.60 Cu max, 23.50-24.00; 13 alloy, 0.60 Cu max, 23.50-24.00; 195 alloy, 24.75-25.75; 108 alloy, 22.25-22.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 22.00; grade 3, 21.00; grade 4, 20.00.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.955, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $5.70-15.50; sheared mill plate, $4.45-9.00; wire, $5.00-9.50; forging billets, $3.00-4.75; hot-rolled and forged bars, $3.39-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $11.00-16.00; H.R. strip, $11.00-15.00; C.R. strip, $13.00-18.00; forged or H.R. bars, $11.00-15.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R.	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.183	24-72	72-180	45.40-48.00
0.183-0.154	24-72	72-180	45.40-48.00
0.154-0.120	24-72	72-180	45.90-48.80
0.120-0.096	24-72	72-180	45.90-48.80
0.096-0.076	24-72	72-180	46.40-50.30
0.076-0.060	24-72	72-180	46.90-51.10
0.060-0.047	24-72	72-180	47.40-52.30
0.047-0.037	24-72	72-180	47.90-53.70
0.037-0.030	24-72	72-180	48.40-55.30
0.030-0.023	24-60	72-180	48.90-57.10
0.023-0.018	24-48	72-144	49.40-57.40
0.018-0.014	24-48	72-144	51.20-58.00
0.014-0.011	24-48	72-144	53.50-60.00
0.011-0.0085	24-36	72-96	56.20
0.0085-0.007	24-36	72-96	59.20
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates: 1100, 3003, and 5005, mill finish, 0, H12, and H14 tempers, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
3.000-2.000	6-144	72-240	46.10-51.00
2.000-1.251	6-144	72-240	46.50-51.30
1.251-0.751	6-144	72-240	45.50-50.60
0.751-0.250	6-144	72-240	45.50-50.60

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Rounds, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.75-24.25; No. 2 heavy copper and wire, 23.00-23.50; light copper 20.25-20.75; No. 1 composition red brass, 20.75-21.25; No. 1

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	56.13b	50.36–51.36	....	57.32
Yellow Brass	49.27	35.77c	49.56	53.43
Low Brass, 80%	52.15	52.09	52.44	56.21
Red Brass, 85%	53.17	53.11	53.46	57.23
Com. Bronze, 90%	54.73	54.67	55.02	58.54
Manganese Bronze	57.69	51.27	61.54	....
Muntz Metal	51.94	47.25	....	....
Naval Brass	53.94	47.75	60.25	58.10
Silicon Bronze	61.39	60.58	60.68	79.80
Nickel Silver, 10%	65.56	67.16	66.91	....
Phos. Bronze, A-5%	76.97	77.47	76.72	78.90

SCRAP ALLOWANCES d (Based on copper at 31.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper	27.00	27.00	26.25
Yellow Brass	20.375	19.50e	18.50c
Low Brass, 80%	22.875	22.625	22.125
Red Brass, 85%	23.875	23.625	23.125
Com. Bronze, 90%	24.75	24.50	24.00
Manganese Bronze	19.25	19.00	18.50
Muntz Metal	19.125	18.875	18.375
Naval Brass	19.00	18.75	18.25
Silicon Bronze	26.50	26.25	25.75
Nickel Silver, 10%	26.00	25.75	13.00
Phos. Bronze, A-5%	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 19.75-20.25; new brass clippings, 18.25-18.75; light brass, 15.25-15.75; heavy yellow brass, 15.25-15.75; new brass rod ends, 17.25-17.75; auto radiators, unsweated, 16.75-17.25; cocks and faucets, 17.50-18.00; brass pipe, 17.75-18.25.

Lead: Soft scrap lead, 7.25-7.50; battery plates, 3.00-3.25; linotype and stereotype, 8.50-8.75; electrotype, 8.00-8.25; mixed babbitt, 10.00-10.50.

Monel: Clippings, 26.00-26.50; old sheets, 25.00-25.50; turnings, 18.50-19.00; rods, 25.00-25.50.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 56.00-58.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.50; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 4.00-4.50; segregated low copper clips, 10.75-11.25; segregated high copper clips, 9.75-10.25; mixed low copper clips, 10.25-10.75; mixed high copper clips, 9.75-10.25.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 9.50-10.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.50-15.00; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.50; clean borings and turnings, 8.50-9.00; segregated low copper clips, 13.50; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50-13.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.
Copper and Brass: No. 1 heavy copper and wire, 28.50; No. 2 heavy copper and wire, 26.25; light copper, 24.00; refinery brass (60% copper) dry copper content, 25.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 28.50; No. 2 heavy copper and wire, 26.25-26.50; light copper, 24.00-24.50; No. 1 composition borings, 23.50-24.00; No. 1 composition solids, 24.50; heavy yellow brass solids, 19.00; yellow brass turnings, 18.00; radiators, 21.00.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 137.50; 200-499 lb, 136.00; 500-999 lb, 135.50; 1000 lb or more, 135.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.25, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.
Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 400-4900 lb, 42.50; 500-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 lb, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 87.80; 100-600 lb, 78.10; 700-1900 lb, 75.40; 2000-9900 lb, 73.50; 10,000 lb or more, 72.20.

Stannous Chloride (Anhydrous): 100 lb, 146.60; 400 lb, 136.60; 800-19,900 lb, 115.30; 20,000 lb or more, 111.10.

Stannous Sulphate: Less than 50 lb, 154.00; 50 lb, 124.00; 100-1900 lb, 122.00; 2000 lb or more, 120.00.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

Steel Ingot Production—July, 1961

Period	Open Hearth (Net tons)	Bessemer (Net tons)	Basic Oxygen Process (Net tons)	Electric (b) (Net tons)	Totals (Net tons)	Index (a)
1961						
January	5,539,900	49,609	213,255	613,240	6,416,004	77.8
February	5,347,458	68,138	225,963	597,539	6,239,098	83.7
March	6,068,244	75,694	281,898	660,753	7,086,389	85.9
1st Quarter	16,955,602	193,441	720,916	1,871,532	19,741,491	82.4
April	6,551,518	65,503	269,991	697,675	7,584,687	95.0
May	7,743,927	79,758	342,251	814,690	8,980,626	108.9
*June	7,375,876	85,494	323,589	766,897	8,551,856	107.1
*2nd Quarter	21,671,321	230,755	935,831	2,279,262	25,117,169	103.7
*1st Half	38,626,923	424,196	1,656,747	4,150,794	44,858,660	93.1
†July	7,131,000	79,000	254,000	626,000	8,090,000	98.1
1960						
January	10,510,616	211,132	280,981	1,046,675	12,049,404	146.1
February	9,715,527	216,263	245,458	949,558	11,126,806	144.2
March	10,103,122	202,812	306,741	952,008	11,564,683	140.2
1st Quarter	30,329,265	630,207	833,180	2,948,241	34,740,893	143.4
April	8,603,306	105,336	302,763	766,452	9,777,857	122.5
May	7,844,140	73,010	309,505	603,817	8,830,472	107.0
June	6,441,594	80,344	314,766	568,169	7,404,873	92.7
2nd Quarter	22,889,040	258,690	927,034	1,938,438	26,013,202	107.4
1st Half	53,218,305	888,897	1,760,214	4,886,679	60,754,095	125.4
July	5,494,331	61,700	289,003	505,890	6,350,924	77.0
August	5,860,394	52,652	279,550	645,404	6,838,000	82.9
September	5,525,244	42,228	287,323	603,626	6,458,421	80.9
3rd Quarter	16,879,969	156,580	855,876	1,754,920	19,647,345	80.2
Nine Months	70,098,274	1,045,477	2,616,090	6,641,599	80,401,440	110.3
October	5,917,780	56,914	270,450	623,236	6,868,380	83.3
November	5,308,894	51,246	257,286	554,514	6,171,940	77.3
December	5,042,558	35,559	202,330	559,394	5,839,841	70.8
4th Quarter	16,269,232	143,719	730,066	1,737,144	18,880,161	77.1
2nd Half	33,149,201	300,299	1,585,942	3,492,064	38,527,506	78.7
Totals (1960)	86,367,506	1,189,196	3,346,156	8,378,743	99,281,601	101.9

*Revised. †Preliminary. (a) Index based on average production 1957-59 as 100. (b) Includes crucible steel. Data from American Iron & Steel Institute.

Steel Output in July off But Tops That a Year Ago

Production of steel ingots during July totaled 8,090,000 net tons, reports the American Iron & Steel Institute. The total was down from the 8,551,856 tons produced in June, but was up sharply from the 6,350,924 tons poured in July, 1960.

July was the third consecutive month in which output exceeded that in the corresponding months of last year.

During the first seven months this year production totaled 52,948,660 net tons, down substantially from the 67,105,019 tons poured in the like period last year.

The index of steelmaking (based on average output in 1957-59 as 100) came to 98.1 during July against 107.1 in June and 77 in July, 1960. On the same basis, the index for the first seven months was 93.8 vs. 118.4 in the same period last year.

Plates . . .

Plate Prices, Page 93

Demand for plates is trending upward. In the Southwest, plate ordering is reported setting the market pace. In the Midwest, a flurry of buying for pipelines is noted, though the tonnage involved is not particularly large. To some extent, the better volume of orders is attributable to the national defense buildup and the possibility of higher prices this fall.

For the most part, only small jobs involving plates are up for bidding.

Carbon plates are available for delivery from mills in two to three weeks. The thicker gages, requiring gas cutting, take four to five weeks.

Pig Iron . . .

(*Concluded from Page* 105)

064 tons of ferromanganese and spiegel, from May's total of 5,693,628 tons, including 47,238 tons of the ferroalloys. Output in the first half amounted to 28,737,280 tons, including 231,034 tons of ferromanganese and spiegel.

CLASSIFIED

Help Wanted

DEVELOPMENT ENGINEER — Refractories Specialties. Ceramic Engineer—Experience castable, ramming and laying cement development. Salary commensurate with experience and capabilities. Send detailed resume and salary requirements to: Mr. J. S. Catapano, The Carborundum Company, Box 268, Perth Amboy, New Jersey.

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All classifications other than "Position Wanted" set solid, 50 words or less $20.00, each additional word, .40; all capitals, 50 words or less $23.00, each additional word .50; all capitals leaded, 50 words or less $28.00, each additional word .65, "Position Wanted" set solid, 25 words or less $5.50, each additional word .22; all capitals 25 words or less $7.50, each additional word .29; all capitals leaded 25 words or less $9.00, each additional word .35. Keyed address takes seven words. Cash with order necessary on "Position Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.

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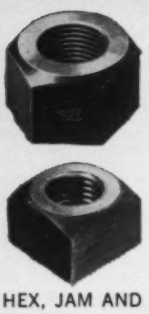
HEX, SQUARE AND SOCKET HEAD BOLTS



HEX, JAM AND SQUARE NUTS

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HEX AND SOCKET HEAD CAP NUTS

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Now you can meet all your large fastener requirements quickly, easily, from one dependable source. Bulletin 160 describes the complete line of large fasteners of every description mady by this 88-year old manufacturer. Forged for greatest resistance to impact and shock, these fasteners cut costs on bridges, power plants, docks, heavy machinery, dams, locks, etc. Send for your copy today. Write for Bulletin 160, Joseph Dyson & Sons, Inc., 5125 St. Clair Avenue, Cleveland 3, Ohio. 'Phone HE 1-6157.

Size: 1 3/4" thru 12" bolt diameter

DYSON

TRADE MARK

Haynes Raises Prices On Wrought Alloys

Haynes Stellite Co., Kokomo, Ind., a division of Union Carbide Corp., last week announced price increases on its wrought alloys ranging from 3 to 11 cents a pound. The hikes, effective Aug. 14, reflect production cost increases.

Steel Bars . . .

Bar Prices, Page 93

August shipments of hot rolled carbon bars will be a little heavier than July's, but they won't equal June's in the opinion of some producers. Orders are still being taken for August shipment, so it's possible a late spurt may boost shipments to the May-June level.

Lack of buying support from the automotive industry is the main reason why August shipments aren't expected to be much above July's. Barmakers are expecting their sales to improve noticeably next month, barring an auto strike. Advance bookings for September shipment so far are thin. More advance booking is being done in hot rolled alloy bars than in the plain carbon bars.

Pacific Tube Co., Los Angeles, has expanded its cold drawn bar production to include alloy steels.

Structural Shapes . . .

Structural Shape Prices, Page 93

Shipments of structurals will be up moderately this month. They were off in July because of vacation suspensions at many fabricating plants. Steelmakers are hopeful of a strong pickup in demand over coming weeks. Their bookings for September are thin. But they look for orders to accelerate since there's a lot of work on drawing boards.

Contract awards on engineering projects in 11 western states up to Aug. 5 topped the $3.2 billion mark, about $100 million below the total for the like 1960 period. Roadwork led, totaling about $551 million, $13 million more than a year ago at this time.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4950 tons, office building, Phoenix Mutual Life Insurance Co., Hartford, Conn., to Bethlehem Steel Co., Bethlehem, Pa., through George A. Fuller Co., Boston, general contractor.

1530 tons, office, Hightstown, N. J., for

McGraw Hill Publishing Co., New York, to Bethlehem Fabricators, Allentown, Pa.; 150 tons of reinforcing bars also required.

400 tons, Montana State bridge, Missouri River, to the Pacific Coast Div., Bethlehem Steel Co., Seattle.

195 tons, 25 tons of reinforcing also involved, county bridge, Yakima, Wash., to United Concrete Pipe Corp., Auburn, Wash.; Hans Skov Construction Co., Yakima, general contractor.

170 tons, Oregon State, Coquelle River bridge, to Gunderson Bros. Engineering Co., Portland, Oreg.

150 tons, lighting towers, Paine Air Field, Washington State; to United Concrete Pipe Corp., Auburn, Wash.

140 tons, dormitories, University of Puget Sound, Tacoma, Wash., to Standard Wire & Steel Co., Tacoma; Strom Construction Co., Tacoma, general contractor.

135 tons, Oregon State, traffic interchange, Eugene, Oreg., and bridge at Lynden, Wash., to United Concrete Pipe Corp., Auburn, Wash.

STRUCTURAL STEEL PENDING

630 tons, coal conveyor, Indiana & Michigan Electric Co., Lawrence, Ind.; bids closed Aug. 7.

600 tons, mill building, Carpenter Steel Co., Reading, Pa.; bids closed on the general contract.

426 tons, state bridge work, Route 80, Section 4-C, Bergen County, New Jersey; Poirier & McLane, low on general contract.

400 tons, 708 ft Missouri River bridge, Montana state; bids in.

300 tons, apartment building, Salem, Oreg.; bids in.

290 tons, guidance and control laboratory, Huntsville, Ala.; bids Sept. 12, George C. Marshall Space Flight Center, NASA, Huntsville.

130 tons (also 100 tons reinforcing), Washington state highway crossing, Clark County; bids to Olympia, Aug. 15.

100 tons, Queensborough Community College, Bayside, N. Y., bids Aug. 17.

REINFORCING BARS . . .

REINFORCING BARS PLACED

235 tons, Bureau of Public Roads bridge, Curry County, Oreg., to unstated interest; Tom Lillebo, Reedsport, Oreg., general contractor.

215 tons, Bureau of Public Roads bridge, Josephine County, Oreg., to unstated interest.

200 tons, Washington State highway span, Clark County, to unstated interest; Hannon Bros., Portland, Oreg., general contractor.

192 tons, Tolt River bridge, Seattle Water System project, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Anderson Construction Co., Vancouver, B. C., general contractor.

RAILS, CARS . . .

RAILROAD CARS PLACED

Norfolk & Western, 100 boxcars to the St. Louis plant of ACF Industries Inc., New York.

Southern Pacific, forty, 86 ton gondola cars, to Baldwin-Lima-Hamilton Corp., Eddystone, Pa.

Detroit, Toledo & Ironton, 75 covered hopper cars to ACF Industries Inc., New York.

National Railways of Mexico, 40 covered hopper cars to Pullman-Standard Div., Pullman Inc., Chicago.

Dow Chemical Co., ten covered hopper cars, to General American Transportation Corp., Chicago.

Corn Products Co., seven covered hopper cars to the General American Transportation Corp., Chicago.

Koppers Co., two covered hopper cars to the General American Transportation Corp., Chicago.

RAILROAD CARS PENDING

Philadelphia Passenger Service Improvement Corp., stainless steel commuter cars; the Budd Co., Philadelphia, offers to build 24 for $6,186,500 or 54 for $13,518,900. No action reported, but plans are to acquire and lease such equipment to the Pennsylvania and Reading railroads.

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Automation Makes More Jobs

■

COMING IN

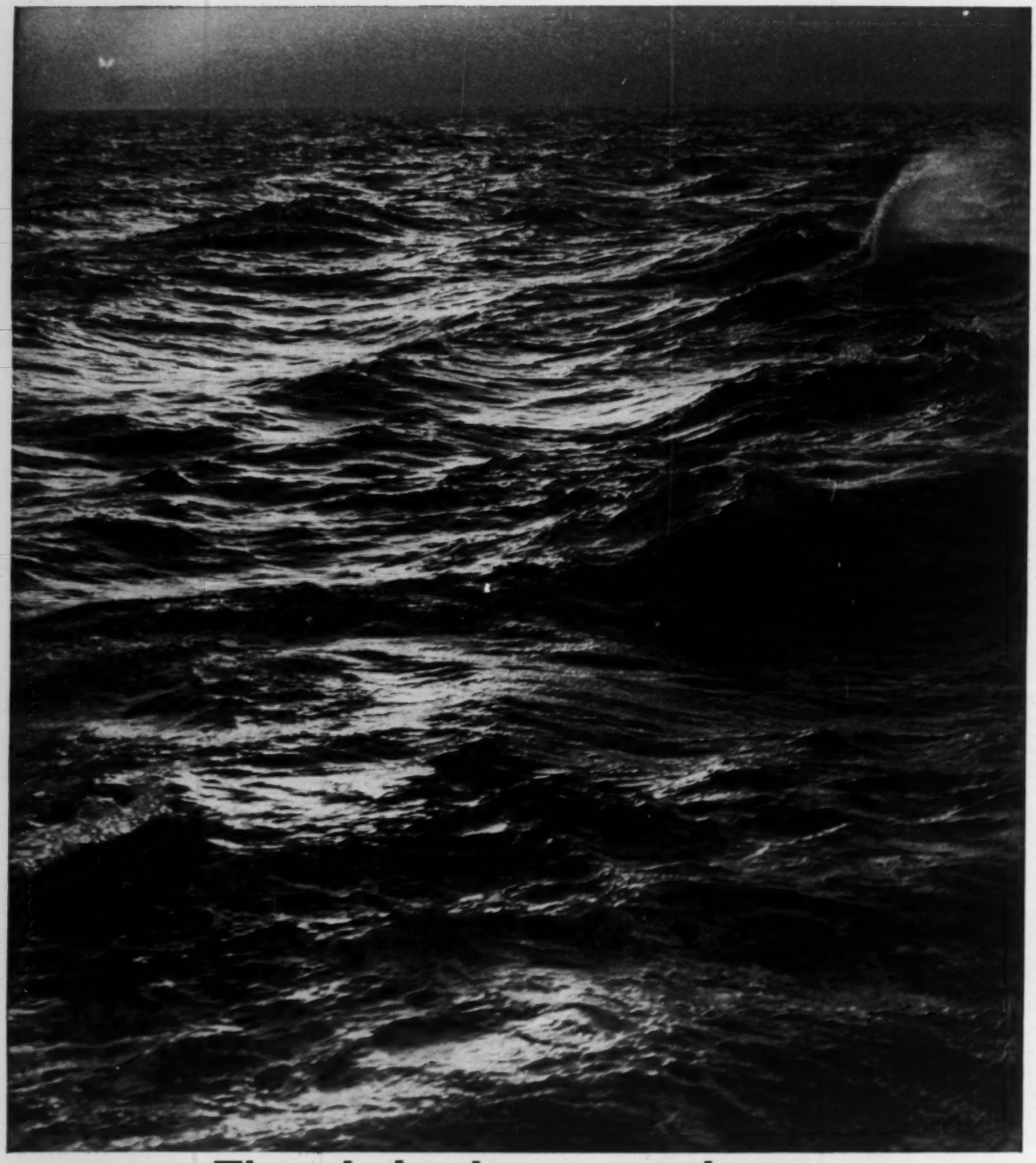
Sept. 4

STEEL

Automation is America's biggest job maker, not the ominous threat to employment that union leaders and others claim. So, to create more jobs, we need more automation, not less.

That's the thesis of STEEL's next impact issue, Sept. 4. A team of ten editors has been working on the special report since May. The regular format for the issue will be discarded, and we'll bring you a 40-page survey in depth on automation and its effects on jobs.

The Sept. 4 study will be STEEL's fourth Impact Issue, a new kind of business paper reporting.



There's business out there.

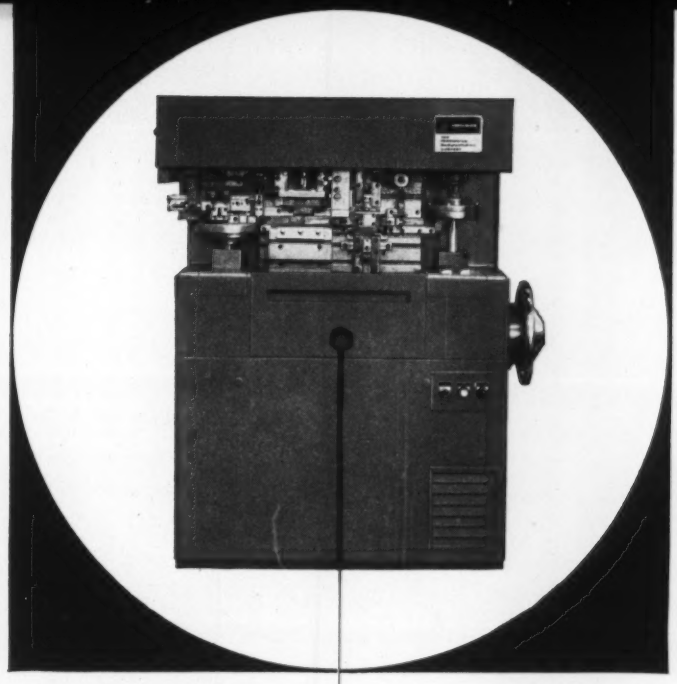
You're looking at more than a horizon. It's a future, yours and America's. Out there is Europe and Latin America and Asia and Africa. But in 1960, of all U.S. manufacturers, less than 5% saw these foreign shores for what they are worth: a 19-billion-dollar export market, a vast source of foreign trade.

Move in for your share. Build your business and help keep America growing. Extra production creates more jobs, helps balance the outflow of gold, and wins new friends abroad with U.S.-made products.

Even if you've never sold overseas, you have a rare opportunity to start—now. Your U.S. Department of Commerce will help with counsel by experts on what, where and how to sell—with data on credits, payments and financing. A package of invaluable know-how is yours for the asking.

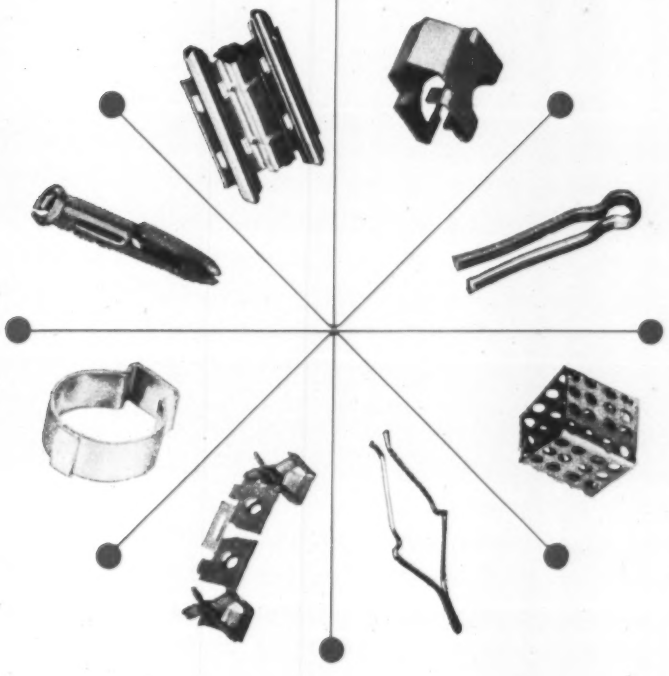
Now's the time to discover the many ways in which your business can grow. In the lucrative export markets. In new U.S. markets. In developing new products. In attracting new industry to your community. Just write or phone the U.S. Department of Commerce Office of Field Services in your city, or Washington 25, D.C. They are ready to help you grow with America!

NOW'S THE TIME TO GET GROWING IN A GROWING AMERICA!



This is the machine

These are its products



If you recognize parts like these you should be familiar with this machine

The machine is a **Verti-Slide.** It can press, punch, and form in one continuous operation — and in addition, weld, thread roll, swage and do other secondary work. If you now use or supply small parts, made from wire or strip stock, the **Verti-Slide** method can offer you many dramatic production advantages. To evaluate your need write today for our **Parts Cost Package.**

TORRINGTON

MANUFACTURING COMPANY

MACHINE DIVISION – TORRINGTON, CONNECTICUT

BALAS COLLET MFG. CO. reports...

"tool life up... rejects down, with switch to TIMKEN® STEEL"

Balas Collet Manufacturing Co. chose to make their collets from Timken® alloy steel to help reduce production costs. Controlled grain size and annealing increased their tool life and reduced their machining costs. Controlled analysis resulted in more uniform results in heat treating. Less warpage was experienced in the heat treating process.

Because of the uniform machinability and hardenability, of the Timken alloy steel, savings started immediately. Tool life increased, machining costs fell. Production rates increased and rejections dropped. Balas reports less breakage and longer life for their collets.

Timken steel helps make savings, improve products, because we guard its quality at every manufacturing step. And from bar to bar, order to order, the high quality of Timken steel machining bars is uniform. They machine fast, easily and with good surface. Scrap loss is reduced, machining time is saved. Product quality is maintained.

Timken Company steel experts will gladly work with you on your machining bar requirements. They'll help you select the analysis that will do the best job at lowest cost. Write: The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Makers of Tapered Roller Bearings, Fine Alloy Steel and Rock Bits.

TIMKEN®
FINE ALLOY STEEL

TIMKEN ALLOY STEEL AND SEAMLESS STEEL TUBING ARE AVAILABLE FROM STEEL SERVICE CENTERS IN 44 CITIES IN THE UNITED STATES